FURUNO

OPERATOR'S MANUAL

COLOR DGPS/PLOTTER
COLOR GPS/PLOTTER

MODEL

GP-1850D, GP-1850 FURUNO/NAVIONICS

GP-1850D, GP-1850 FURUNO/C-MAP NT

FURUNO ELECTRIC CO., LTD.
NISHINOMIYA, JAPAN

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•Your Local Agent/Dealer

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⚠ SAFETY INSTRUCTIONS

⚠ WARNING

Do not open the equipment.

Hazardous voltage which can cause electrical shock, burn or serious injury exists inside the equipment. Only qualified personnel should work inside the equipment.

Do not disassemble or modify the equipment.

Fire, electrical shock or serious injury can result.

Turn off the power immediately if water leaks into the equipment or the equipment is emitting smoke or fire.

Continued use of the equipment can cause fire or electrical shock.

Do not place liquid-filled containers on the top of the equipment.

Fire or electrical shock can result if a liquid spills into the equipment.

Do not operate the equipment with wet hands.

Electrical shock can result.

Keep heater away from equipment.

Heat can alter equipment shape and melt the power cord, which can cause fire or electrical shock.

⚠ CAUTION

Do not use the equipment for other than its intended purpose.

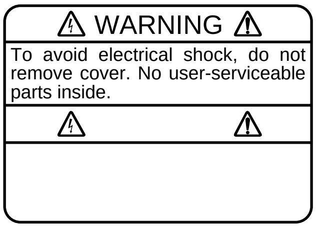
Use of the equipment as a stepping stool, for example, can result in personal injury or equipment damage.

No one navigation device should ever be solely replied upon for the navigation of a vessel.

Always confirm position against all available aids to navigation, for safety of vessel and crew.

GPS position and velocity accuracies are controlled by the U.S. Department of Defense. Position may be degraded up to 100 meters.

A warning label is attached to the equipment. Do not remove the label. If the label is missing or illegible, contact a FURUNO agent or dealer.



Name: Warning Label (1)
Type: 86-003-1011-0
Code No.: 100-236-230

About the TFT LCD

The TFT LCD is constructed using the latest LCD techniques, and displays 99.99% of its pixels. The remaining 0.01% of the pixels may drop out or blink, however this is not an indication of malfunction.

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Declaration of Conformity

A Word to GP-1850D/1850 Owners

Congratulations on your choice of the FURUNO GP-1850D COLOR DGPS/PLOTTER, GP-1850 COLOR GPS/PLOTTER. We are confident you will see why the FURUNO name has become synonymous with quality and reliability.

For over 50 years FURUNO Electric Company has enjoyed an enviable reputation for innovative and dependable marine electronics equipment. This dedication to excellence is furthered by our extensive global network of agents and dealers.

This equipment is designed and constructed to meet the rigorous demands of the marine environment. However, no machine can perform its intended function unless installed, operated and maintained properly. Please carefully read and follow the recommended procedures for operation and maintenance.

We would appreciate hearing from you, the end-user, about whether we are achieving our purposes.

Thank you for considering and purchasing FURUNO equipment.

Features

The GP-1850D is a totally integrated DGPS beacon receiver, GPS receiver, and color video plotter. The GP-1850 mostly shares the same features with the GP-1850D except it does not have a built-in DGPS beacon receiver.

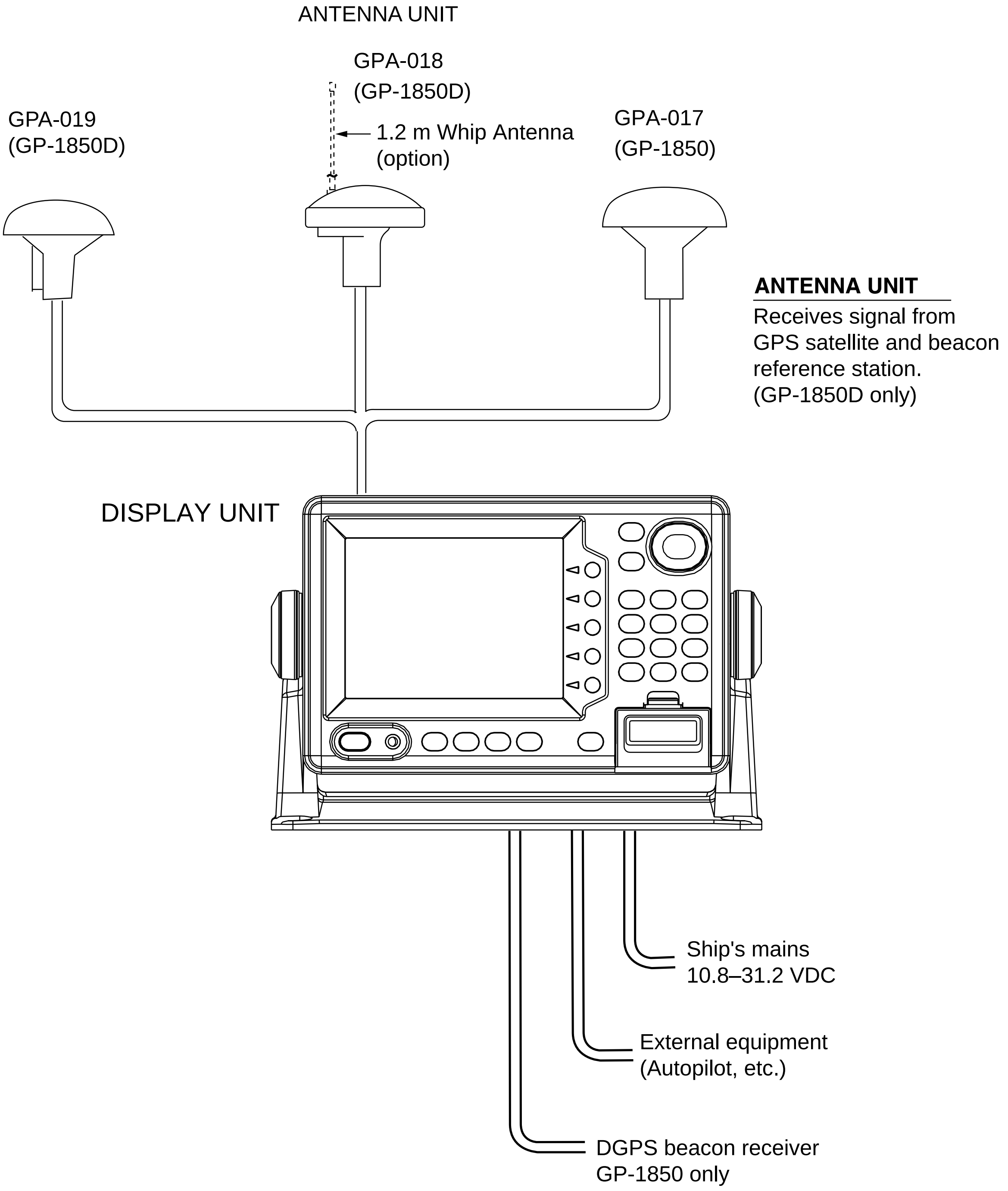
Navigation information is displayed on a bright 6.5-inch color TFT LCD. On-screen information shown are position, range and bearing to cursor position, range, bearing, ETA and TTG to waypoint, etc.

A high sensitivity receiver tracks up to twelve satellites simultaneously. An 8-state Kalman filter ensures optimum accuracy in determination of vessel position, course and speed. C-MAP NT-FP chart card is available for the GP-1850/1850D C-MAP NT.

The main features of the GP-1850D/GP-1850 are

- Comprehensive navigation data displays.
- Bright 6.5-inch color TFT LCD with temperature compensated tone and brilliance control.
- Automatic coastline chart loading.
- Position display in latitude and longitude, Loran C or Decca TDs.
- Improved position accuracy with optional DGPS beacon receiver (GP-1850).
- Accepts both FURUNO and NAVIONICS or C-MAP NT mini chart cards.
- Alarms: Arrival, Anchor Watch, Cross-track Error, Speed, Proximity.
- Man overboard feature records latitude and longitude coordinates at time of man overboard.
- “Highway” display provides graphic presentation of ship’s track and is useful for monitoring cross track error.

SYSTEM CONFIGURATION



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1. OPERATIONAL OVERVIEW

This chapter acquaints you with the basics of your unit - from turning on the power to the soft key menu operation.

1.1 Display Unit Controls

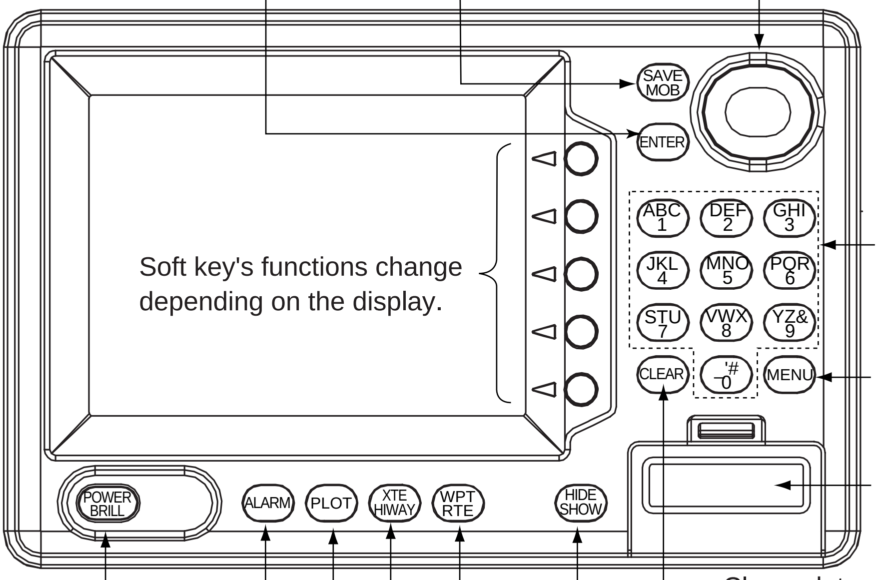
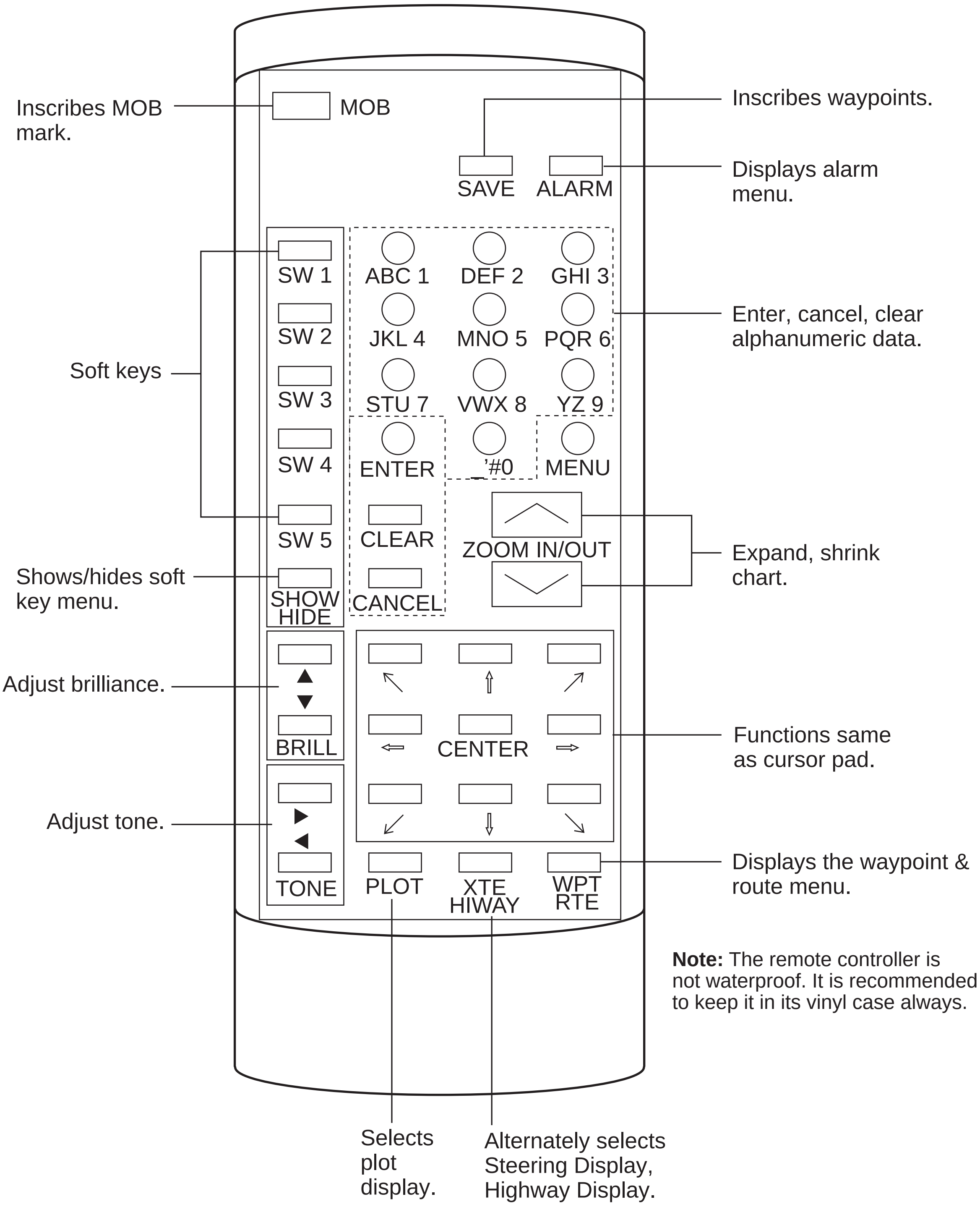


Figure 1-1 Display unit

1.2 Remote Controller



Note: The remote controller is not waterproof. It is recommended to keep it in its vinyl case always.

Figure 1-2 Remote controller

1.3 Inserting Mini Chart Card

Insert appropriate mini chart card before turning on the power.

1. Push down the lid catch to open the mini chart card slot cover.

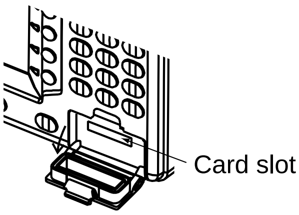


Figure 1-3 Location of mini chart card slot cover

2. Insert appropriate mini chart card groove side up.
3. Close the slot cover to protect the chart drive. (Keep the slot cover closed at all times.)

Note: Turn off power before inserting or ejecting the mini chart card.

1.4 Turning the Power On/Off

Press the [POWER/BRILL] key at bottom left-hand side of the display unit to turn on the power. When the unit is turned on, it proceeds in the sequence shown in Figure 1-4, after displaying the FURUNO information display.

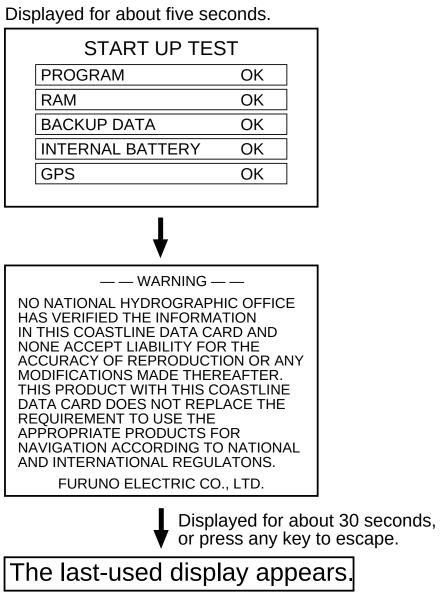


Figure 1-4 Start-up sequence

Your equipment takes about 90 seconds to find its position when turned on for the very first time. This is because the equipment has no satellite data, called the Almanac, in its database. If you want to lessen the time needed to find position you may enter your position manually (default position: San Francisco, USA) on the GPS SETUP OPTIONS menu.

Thereafter it takes about 12 seconds to find position each time the power is turned on.

When the satellite signal is being received normally, the equipment displays various abbreviations at the bottom left-hand corner of the display which show DGPS/GPS receiver status. Table 1-1 shows these abbreviations and their meanings.

Table 1-1 Display abbreviations

Indication	Meaning
GPS 2D	Normal 2D (dimension) GPS position fix
GPS 3D	Normal 3D GPS position fix
DGPS 2D (GP-1850D)	Normal 2D differential GPS position fix
DGPS 3D (GP-1850D)	Normal 3D differential GPS position fix
NO FIX	Position can not be found.
DOP	DOP error
DEMO	Simulation mode

Turning the power off

Press and hold down the [POWER/BRILL] key until the screen goes blank. The time remaining until the power is turned off is shown on the screen.

1.5 Adjusting Tone and Brilliance

1. Press the [POWER/BRILL] key with a touch-and-release action. The tone and brilliance adjustment screen appears.

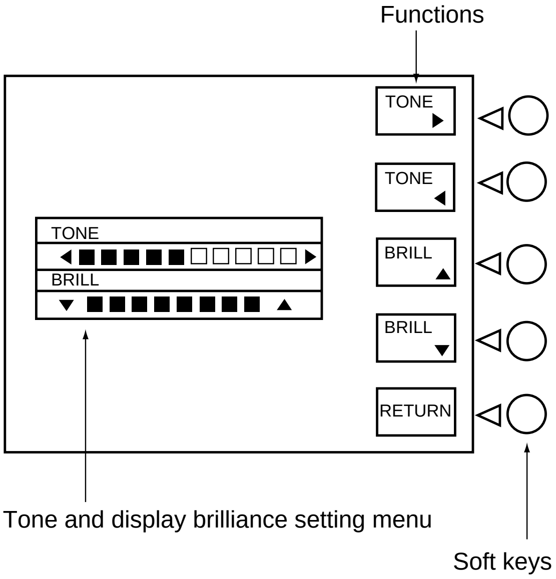


Figure 1-5 Tone and brilliance setting adjustment screen

2. Press ◀ or ▶ to adjust display tone.
3. Press ▲ or ▼ to adjust display brilliance.

Note that tone and brilliance can also be adjusted by soft keys. After pressing the [POWER/BRILL] key, use the appropriate soft key to adjust tone or brilliance.

Note: Tone or brilliance must be adjusted within 10 seconds after pressing the [POWER/BRILL] key or the tone and brilliance adjustment screen will be erased.

1.6 Displays

There are four types of plotter displays: Plotter display, Navigation data display, Steering display and Highway display. For details, refer to Chapter 2.

Plotter display, Navigation data display

Press the [PLOT] key to display the Plotter display and Navigation data display alternately.

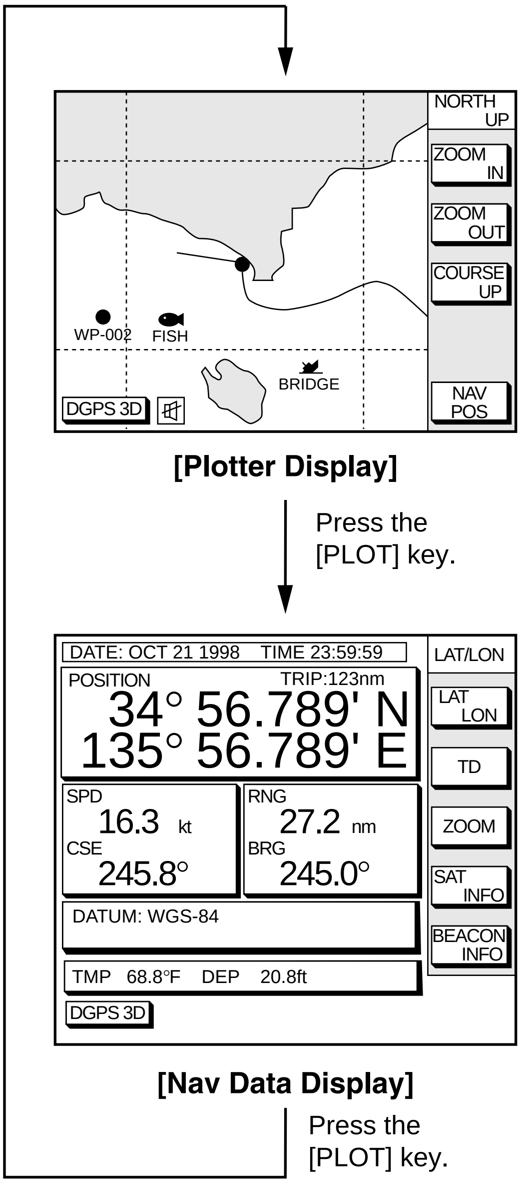


Figure 1-6 Display modes (plotter)

Steering display, Highway display

Press the [XTE/HIWAY] key to display the Steering display, Highway display alternately.

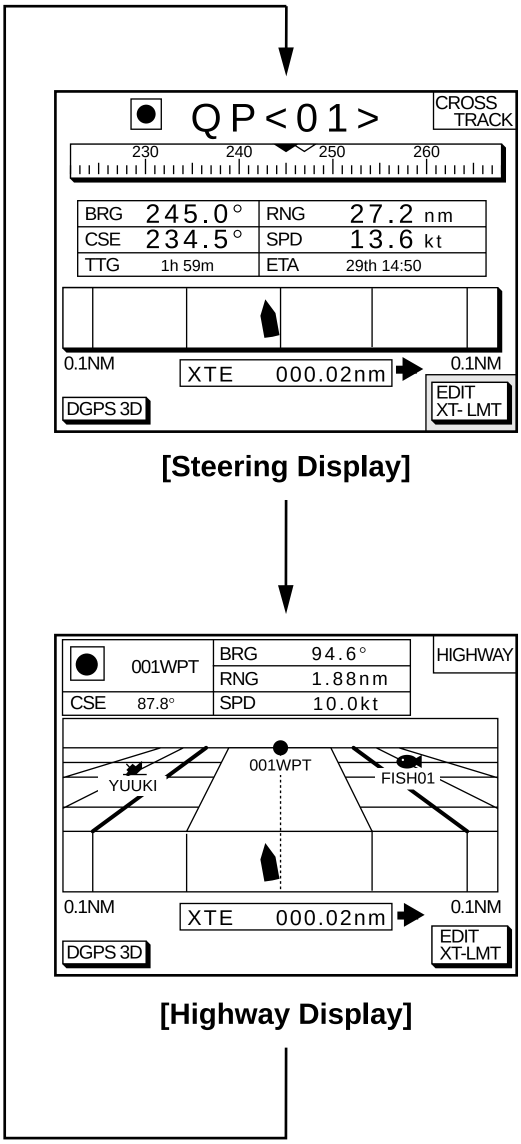


Figure 1-7 Steering display, Highway display

1.7 Menu Operation, Soft Keys

Most operations are carried out through the menu. The menu is opened and closed with the [MENU] key. Menus may be selected with the five soft keys to the right of menus. Options are selected with the cursor pad.

1. Press the [MENU] key to display the main menu.

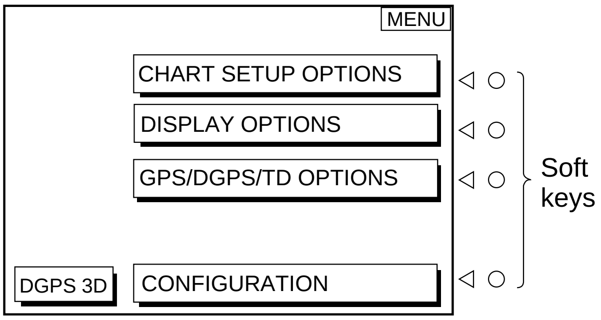


Figure 1-8 Main menu

2. Press appropriate soft key to display desired menu. For example, press the soft key CHART SETUP OPTIONS. The menu in use appears at the top right corner of the display.

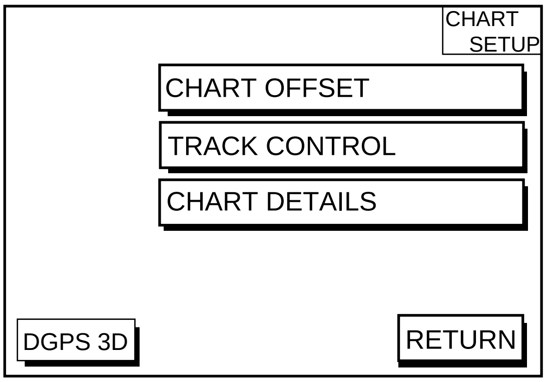


Figure 1-9 Chart setup options menu

3. Select menu with the soft keys. For examples press the soft key TRACK CONTROL to display the track control menu.

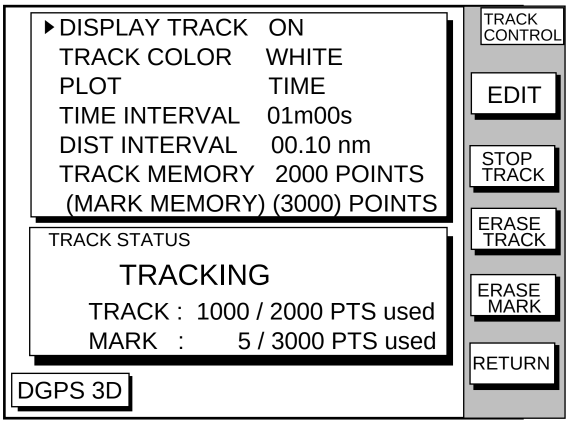


Figure 1-10 Track control menu

4. Use the cursor pad to select item, and then press the soft key EDIT. For example, select TRACK COLOR. The track color window appears.

Figure 1-11 Track color window

5. Use the cursor pad to select option.
6. Press the soft key RETURN to finish.

1.8 Demonstration Display

The demonstration display provides simulated operation of this unit. On the plotter display, own ship tracks, at the speed selected, a figure eight course or any course you enter, starting from position entered. All controls are operative; you may set destination, enter waypoints, etc.

1. Press the [MENU] key, followed by the soft keys CONFIGURATION and SYSTEM MENU to open the system menu.
2. Press the soft key DEMONSTRATION MODE to open the demonstration setting screen.

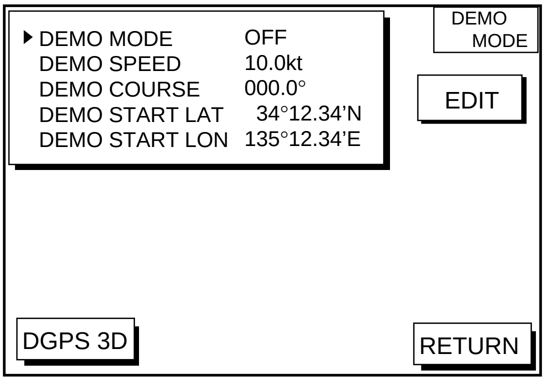


Figure 1-12 Demo setting screen

3. Press ▲ or ▼ to select DEMO MODE.
4. Press the soft key labeled EDIT to show the demo mode window.

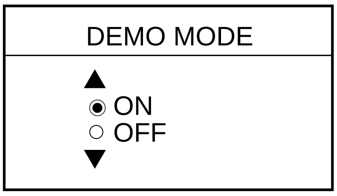


Figure 1-12 Demo mode window

5. Press ▲ to select ON.
6. Press the soft key ENTER or the [ENTER] key.
7. Select DEMO SPEED and press the soft key EDIT. Enter speed with the cursor pad. Select digit with ◀/▶ and enter value with numeric key.
8. Select DEMO COURSE and press the soft key EDIT. Select how you want the courseline to be traced; by FIGURE 8 or DIR.(ection). For DIR., enter course.
9. Select DEMO START LAT., and press the soft key EDIT. Enter current latitude.
10. Select DEMO START LONG., and press the soft key EDIT. Enter current longitude.
11. Press the soft key RETURN to finish.

To cancel the demonstration display, set DEMO MODE to OFF.

2.1 Presentation Modes

The plotter display mainly shows chart, ship's track, waypoints, and navigation data.

Three types of display presentations are provided for the normal plotter display: north-up, course-up and auto course-up. To change the mode, use the presentation mode selection soft key, which is the 3rd soft key from the top.

North-up

Press the soft key NORTH UP to show the north-up display. North (zero degree) is at the top of the display and own ship is at the center of the screen. Own ship marker is a filled circle. This mode is useful for long-range navigation.

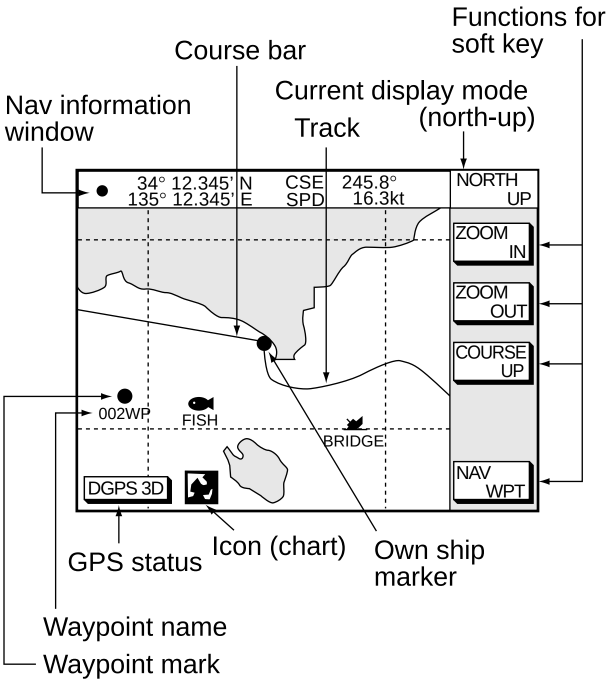


Figure 2-1 Plotter display, north-up mode

Course-up

Press the soft key COURSE UP to show the course-up display. When destination is set it is at the top of the screen, the north mark appears at the upper left side of the screen and points to north. A filled triangle marks own ship's position.

When destination is not set, the course or heading is upward on the screen at the moment the course-up mode is selected.

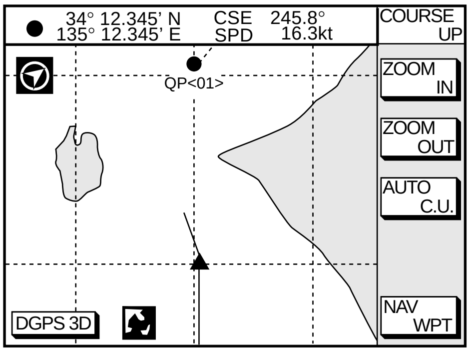


Figure 2-2 Plotter display, course-up mode

Auto course-up

Press the soft key AUTO C.U. to show the automatic course-up display. The course or heading is at the top of screen at the moment the course-up mode is selected. When own ship is off its intended course by 22.5° or more, it is automatically brought back to perpendicular.

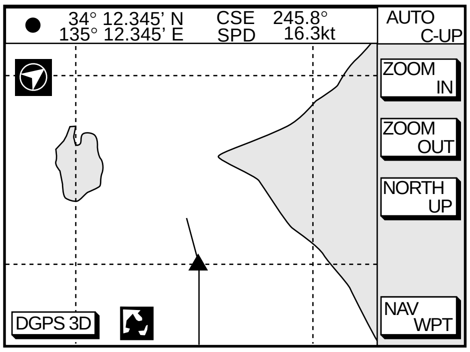


Figure 2-3 Auto course-up mode

2.2 Cursor

Turning on the cursor, shifting the cursor

Press the cursor pad to turn the cursor on, and the cursor appears at the own ship's position. Operate the cursor pad to shift the cursor. The cursor moves in the direction of the arrow or diagonal pressed on the cursor pad.

Cursor state determines what data is shown on the display. Cursor position is displayed in latitude and longitude or Loran or Decca TDs (depending on menu setting) at the top of the plotter display when the cursor is on.

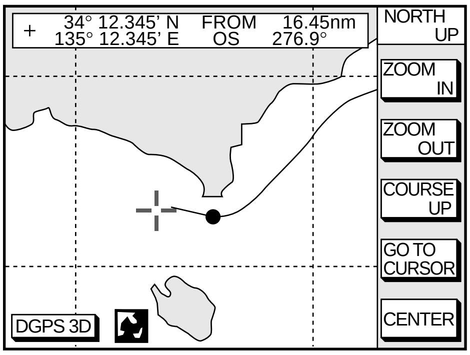


Figure 2-4 Data displayed on the plotter display when the cursor is on

Turning off the cursor, returning own ship marker to screen center

The soft key CENTER turns off the cursor and returns own ship marker to screen center.

2.3 Shifting the Display

The display can be shifted on the plotter display.

1. Press the cursor pad to display the cursor.
2. Locate the cursor at a screen edge. The screen shifts in the direction opposite of cursor location.

2.4 Selecting Chart Scale/Range

Chart scale (range) may be selected with the soft key ZOOM IN or ZOOM OUT. ZOOM IN expands the chart; ZOOM OUT shrinks it.

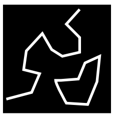
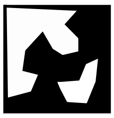
Note: When the display is expanded or shrunk beyond the range of the chart card in use NO CHART appears, along with the appropriate chart icon. See Table 2-1.

2.5 Mini Chart Cards

The mini chart cards contain nautical charts. When you insert a suitable mini chart card in the slot and your boat is near land, a chart appears.

When a wrong card is inserted or a wrong chart scale is selected, the land will be hollow. Insert the proper card and select a suitable chart scale. Chart icons appear to help you select a suitable chart scale. Table 2-1 shows the chart icons and their meanings.

Table 2-1 Chart icons and their meanings

Icon	Meaning
	Proper card is not inserted or chart scale is too small. Press the soft key ZOOM IN to adjust chart scale.
	Chart scale is too large. Press the soft key ZOOM OUT to adjust chart scale.
	Suitable chart scale is selected.

Indices and chart enlargement

When the soft key ZOOM OUT is used, you will see several frames appear on the chart. These frames are called indices and they show you what parts of the chart can be enlarged in the current picture range. The areas circumscribed with smaller frames can be enlarged, but the area enclosed by the largest frame cannot.

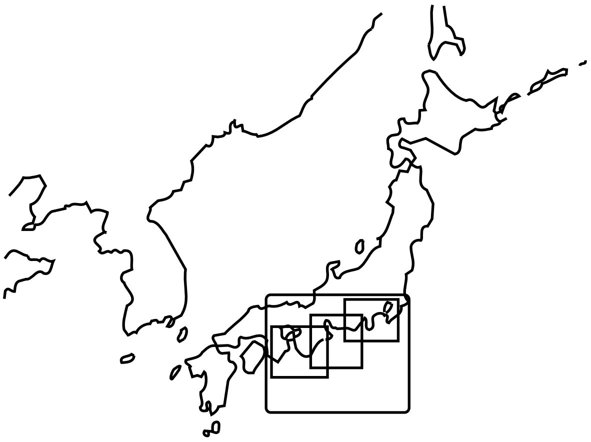


Figure 2-5 Sample chart (Japan and South Korea) showing indices

Remarks on chart display

A chart will not be displayed in the following conditions:

- When the chart scale is too large or too small.
- When scrolling the chart outside the indices.

When this happens, select proper chart scale.

Chart symbols

FURUNO mini chart card

The table below shows FURUNO mini chart symbols and their meanings.

Table 2-2 FURUNO chart symbols

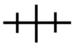
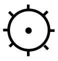
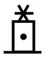
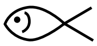
Symbol	Description
	Summit
	Wreck
	Lighthouse
	Lighted Buoy
	Buoy
	Radio Station
•	Position of Sounding
	Obstruction
	Fishing Reef
	Platform
	Anchorage

Table 2-3 Comparison of FURUNO and Nav-Charts™ chart cards

Item	FURUNO	Nav-Charts™
Dot scrolling capability	YES	YES
Course-up display	YES	YES
Lighthouse data presentation	YES *3	YES
Zoom at cursor position	YES	*1
Range at Equator	0.125, 0.5, 1, 2... 2048 nm	Same as left
Chart offset data entry	YES	YES
Centering	YES	*2

*1 Nav-Charts™ chart may not center the cursor perfectly.

*2 Nav-Charts™ chart may not center own ship's position perfectly.

*3 Newly designed chart cards containing lighthouse data. Chart cards for North America area are completed, and others are in production.

*4 Nav-Charts™ is the resistered trademark of NAVIONICS INC.

Aid to navigation data

Selected FURUNO and Nav-Charts™ mini chart cards can show buoy and lighthouse data. Simply place the cursor on the light-house or buoy mark.

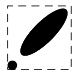


Figure 2-6 Placing the cursor on the mark

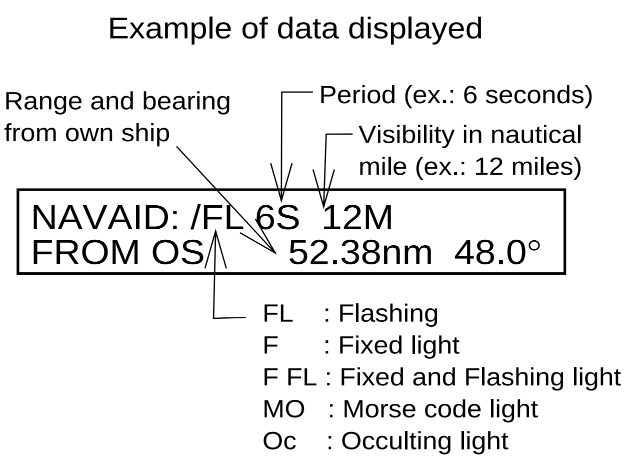


Figure 2-7 Example of buoy, lighthouse data

Port service icons (Nav-Charts™ cards)

Selected Nav-Charts™ mini chart cards show by icons services available at ports. Use the cursor pad to place the cursor on the sail-boat icon (denotes a port or harbor), and then press the [ENTER] key. The services avail-able appear at the top of the display.

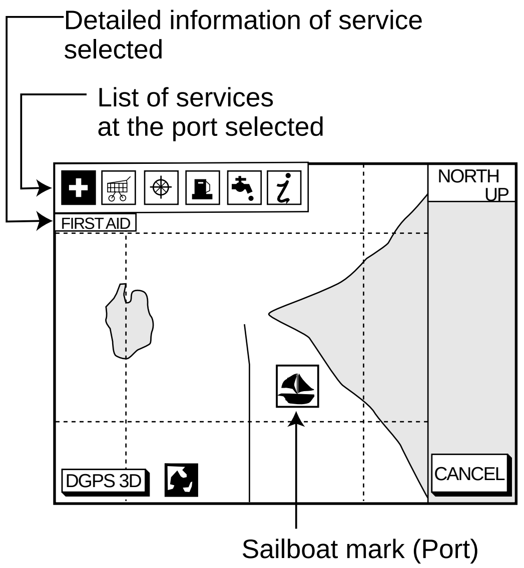


Figure 2-8 Plotter display showing Nav-Charts™ port service display

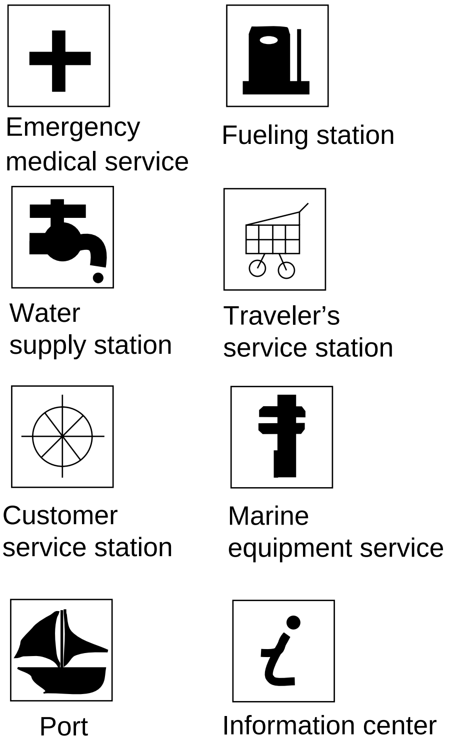


Figure 2-9 Port service icons

2.6 Navigation Data Display

The navigation data display provides generic navigation data and DPGS/GPS information. Press the [PLOT] several times to show the navigation data display.

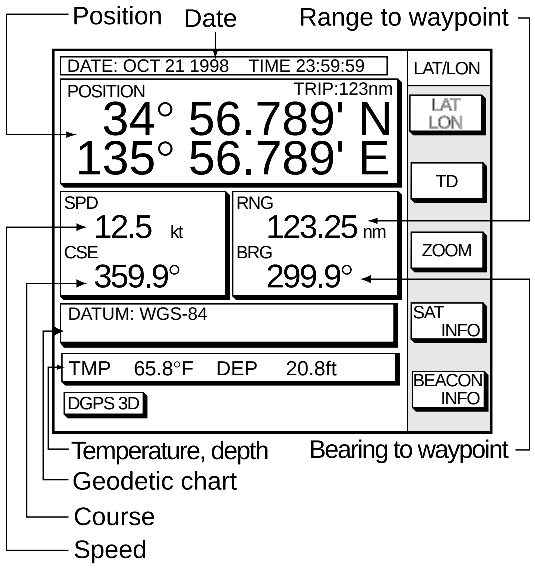


Figure 2-10 Navigation data display

Navigation data display shows the position by L/L or TD (Loran-C, Decca). To change position format, press the appropriate soft key LAT/LON or TD.

Enlarging an indication

An indication on the screen may be enlarged as follows:

1. Use the cursor pad to select the indication which you wish to enlarge. Selected indication is circumscribed with a red cursor.
2. Press the soft key ZOOM.

To return to the normal nav data display, press the soft key RETURN.

GPS satellite monitor display

The GPS satellite monitor display shows information about GPS satellites.

Press the soft key SAT INFO. Your display should look something like the following illustration.

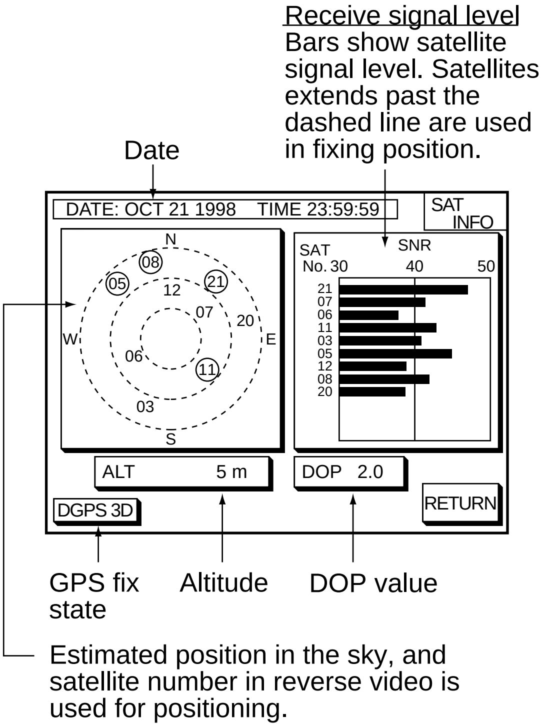


Figure 2-11 GPS satellite monitor display

To return to the normal navigation data display, press the soft key RETURN.

Beacon information display

Equipped with a DGPS beacon receiver, your unit can show DGPS reference station information. Press the soft key BEACON INFO to show the DGPS reference station information.

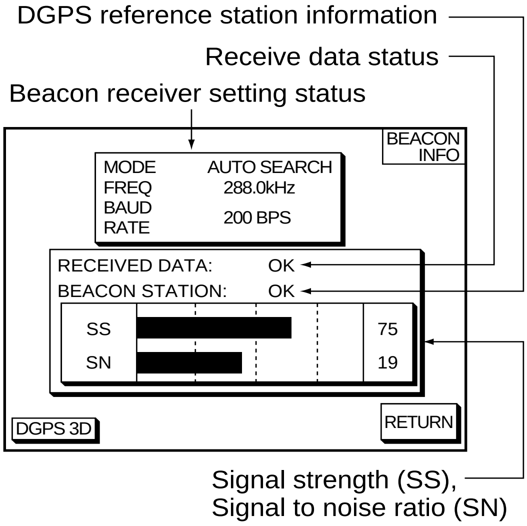


Figure 2-12 Beacon information display

SS: SS (Signal Strength) displays a numeric representation of field strength of the received signal on the selected frequency. The higher the number the stronger the received signal. If noise is present at reception band width, the figure gets bigger.

SN: SN (Signal-to-Noise) ratio displays the ratio between the desired signal and unwanted noise on the selected frequency. The higher the SN ratio the better the quality of the signal.

Note: If your equipment does not have a DPGS receiver, the message "NO DIFFERENTIAL DATA" appears when the soft key BEACON INFO is pressed.

2.7 Steering Display

The steering display provides steering information such as range, bearing, ETA to destination, course and speed.

Press the [XTE/HIWAY] key to show the steering display.

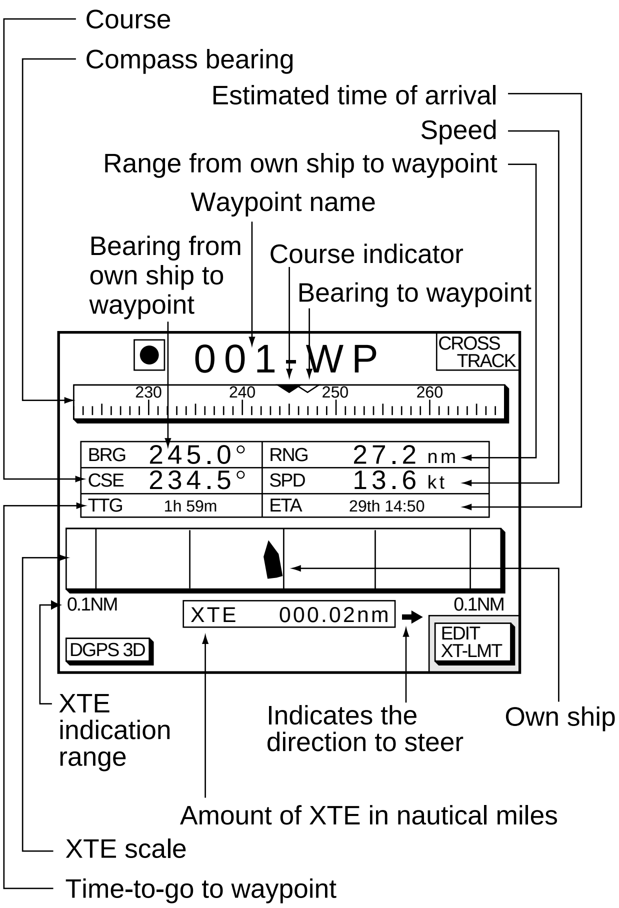


Figure 2-13 Steering display

How to read the compass display

The solid inverted triangle at the center of the compass shows own ship's course (heading). The hollow inverted triangle shows the bearing to destination waypoint. When own ship's course is changed, the hollow inverted triangle moves with course change.

How to read the XTE scale

The black boat-shaped mark shows own boat's movement and direction, and amount to steer to return to course. Using Figure 2-13 as an example, you would steer right by 000.02 nautical miles to return to course. When this mark is out of range of the XTE scale, the mark color changes from black to yellow. The range of the XTE scale can be set as shown below (default: 0.5 nm).

Setting the range of the XTE scale

1. Press the soft key EDIT XT-LMT to display the following window.

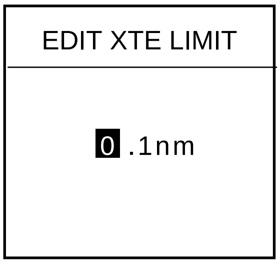


Figure 2-14 XTE range setting window

2. Use the cursor pad to select digit to change.
3. Press appropriate alphanumeric key.
4. Repeat steps 2 and 3.
5. Press the [ENTER] key. To cancel entry, press the soft key CANCEL.

Note that all digits may be cleared by pressing the [CLEAR] key.

2.8 Highway Display

The highway display provides a graphic presentation of ship's track along intended course. It is useful for monitoring XTE - the XTE scale shows direction and amount in nautical miles to steer to return to course. In the figure below, for example, you would steer right by 0.02 nm to return to course.

Press the [XTE/HIWAY] key to show the highway display.

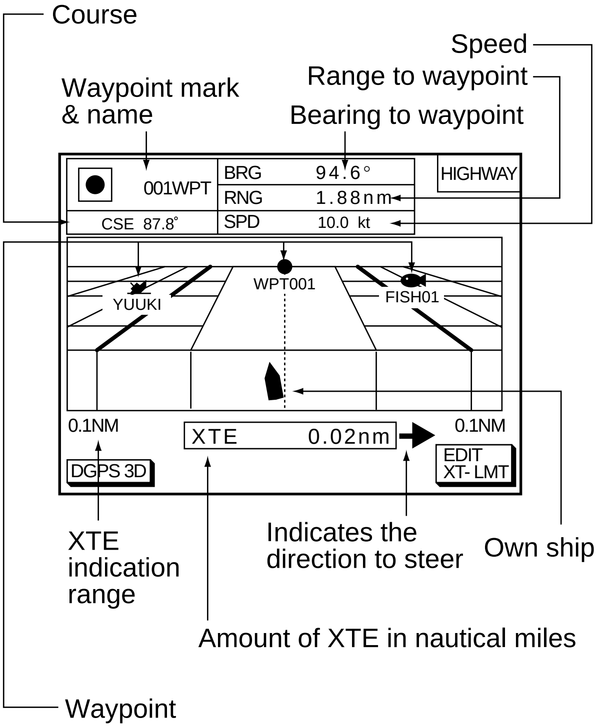


Figure 2-15 Highway display

2.9 Changing Operation Mode

Operation mode can be changed between PLEASURE and FISHING. FISHING mode provides mark/line entry on the PLOTTER display. The mark can be entered up to 5000 points together with tracks. The apportion between track and mark memory can be changed at menu. Pressing the [HIDE/SHOW] key changes the function of soft keys. Holding track, changing track color, and selecting color and form of mark/line can be performed by the soft keys directly.

1. Press the [MENU] key and the soft key DISPLAY OPTIONS. The display setup1 menu appears.

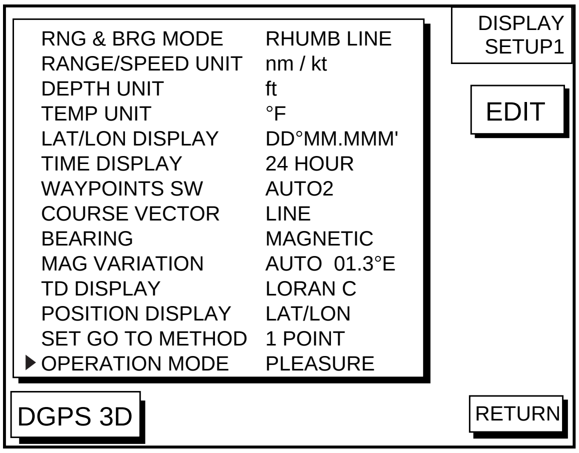


Figure 2-16 Display setup1 menu

2. Press ▼ to select OPERATION MODE.
3. Press the soft key EDIT to show the OPERATION MODE window.

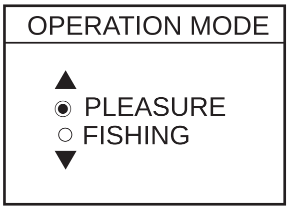


Figure 2-17 OPERATION MODE window

4. Press ▲ or ▼ to select PLEASURE or FISHING.
5. Press the soft key ENTER or the [ENTER] key to finish.

2.10 Navigation Trip Distance

The navigation trip distance is displayed at the navigation data display. Press the [PLOT] key several times to show the navigation data display.

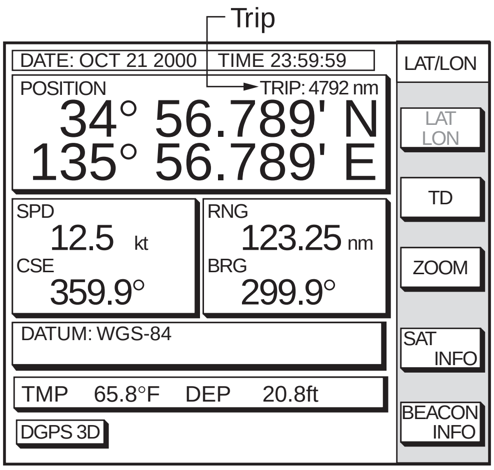


Figure 2-18 Navigation data display

Note: When you enlarge POSITION, TRIP is not displayed.

You can reset the trip distance as follows.

1. Press the [MENU] key followed by the soft keys CONFIGURATION and SYSTEM MENU.
2. Press the soft key MEMORY/TRIP CLEAR to open the clear memory menu.

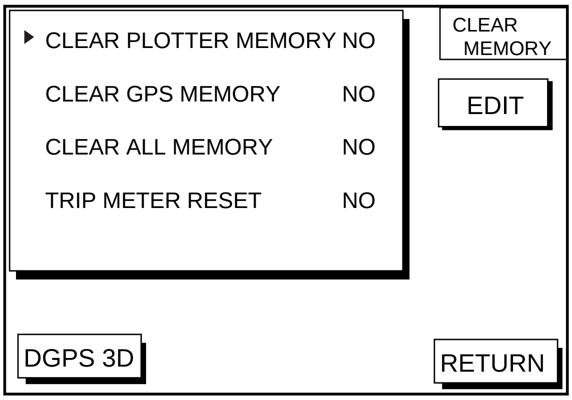


Figure 2-19 Clear memory menu

3. Press ▾ to select TRIP METER RESET.
4. Press the soft key EDIT.
5. Press ▴ to select YES.
6. Press the soft key ENTER or the [ENTER] key to clear memory selected.

3. TRACK

3.1 Displaying Track

1. Press the [MENU] key to open the main menu.

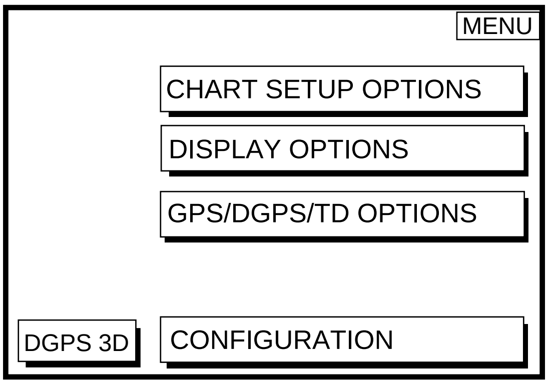


Figure 3-1 Main menu

2. Press the soft key CHART SETUP OPTIONS to open the chart setup menu.

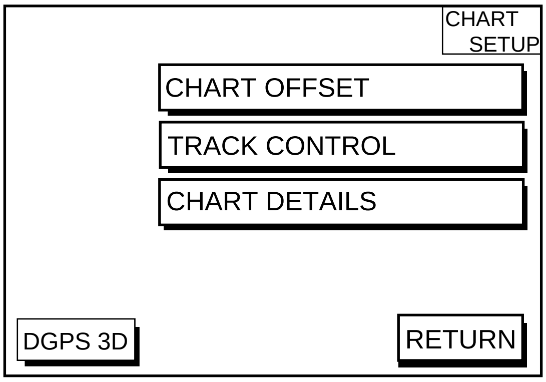


Figure 3-2 Chart setup menu

3. Press the soft key TRACK CONTROL to open the track control menu.

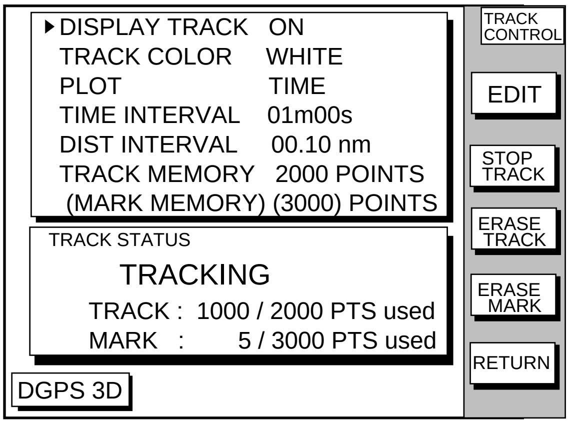


Figure 3-3 Track control menu

4. Press ▲ to select DISPLAY TRACK.
5. Press the soft key EDIT to show the display track window.
6. Press ▲ or ▼ to select ON or OFF as appropriate.
7. Press the soft key ENTER or the [ENTER] key.
8. Press the [PLOT] key to close the menu.

The default setting is ON which traces ship's track in accordance with ship's movements.

Number of track and mark points used appears at the TRACK STATUS window on the TRACK CONTROL display. In case of figure 3-3, track memory is recorded 1000 points (max. 2000 points) and mark memory is recorded 5 points (max. 3000 points).

3.2 Stopping/Restarting Plotting of Track

When your boat is at anchor or returning to port you probably won't need to record its track. You can stop recording the track, to conserve the track memory, as follows:

1. Press the [MENU] key followed by the soft keys CHART SETUP OPTIONS and TRACK CONTROL.
2. Press the soft key STOP TRACK. The indication "TRACKING" in the TRACK STATUS window changes to "NOT TRACKING".

To restart recording the track, press the soft key START TRACK at step 2 in the above procedure.

When the fishing mode is selected, you can stop or restart plotting the track with the soft key only on the plotter display. Press the [SHOW/HIDE] key several times to show the soft key STOP TRACK. Press the soft key STOP TRACK on the plotter display to stop plotting of track. HOLD TRACK PLOTTING appears approx. 2 seconds and own ship mark changes to hollow circle. To restart plotting the track, press the soft key START TRACK. START TRACK PLOTTING appears approx. 2 seconds and the plotting restarts.

3.3 Changing Track Color

Track can be displayed in red, yellow, green, light-blue, purple, blue or white. It can be useful to change track color on a regular basis to discriminate between previous day's track, past track, etc.

1. Press the [MENU] key followed by the soft keys CHART SETUP OPTIONS and TRACK CONTROL.
2. Press ▲ or ▼ to select TRACK COLOR.
3. Press the soft key EDIT to display the track color window.

TRACK COLOR

▲
◉ RED
○ YELLOW
○ GREEN
○ LIGHT BLUE
○ PURPLE
○ BLUE
○ WHITE
▼

Figure 3-4 Track color window

4. Press ▲ or ▼ to select the color desired.
5. Press the soft key ENTER to finish.

When the fishing mode is selected, you can change track color with the soft key only on the track display.

1. Press the [SHOW/HIDE] key several times to show the soft key TRACK COLOR.
2. Press the soft key TRACK COLOR to show the TRACK COLOR window.
3. Press ▲ or ▼ to select the color desired.
4. Press the soft key ENTER or the [ENTER] key to finish, or press the soft key CANCEL to escape.

3.4 Track Plotting Method, Interval

In drawing the track, first the ship's position (fed from the DGPS/GPS receiver) is stored into the unit's memory at an interval of time or distance. A shorter interval provides better reconstruction of the track, but the storage time of the track is reduced. When the track memory becomes full, the oldest track is erased to make room for the latest.

Track plotting method

1. Press the [MENU] key followed by the soft keys CHART SETUP OPTIONS and TRACK CONTROL.
2. Press ▲ or ▼ to select PLOT.
3. Press the soft key EDIT to display the plot window.

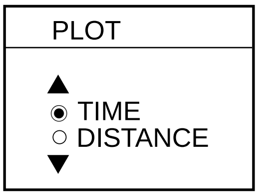
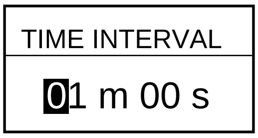


Figure 3-5 Plot window

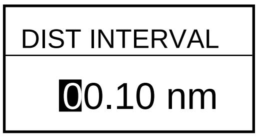
4. Press ▲ or ▼ to select TIME or DISTANCE. Distance is useful for conserving track memory, since no track is recorded when the boat is stationary.
5. Press the soft key ENTER or the [ENTER] key.

Track plotting interval

1. Press the [MENU] key followed by the soft keys CHART SETUP OPTIONS and TRACK CONTROL.
2. Press ▲ or ▼ to select TIME INTERVAL or DIST INTERVAL.
3. Press the soft key EDIT to display the interval window.



(When selecting TIME INTERVAL.)



(When selecting DIST INTERVAL.)

Figure 3-6 Interval window

4. Use the cursor pad to place the cursor on the digit desired. The [CLEAR] key functions to clear an entire line of data.
5. Press appropriate alphanumeric key to enter value.
6. Repeat steps 4 and 5 to complete.
7. Press the soft key ENTER or the [ENTER] key.

3.5 Changing Track Memory Capacity

The equipment stores a total of 5000 points of track and marks. This total may be freely apportioned as desired. The default setting is 2000 points of track and 3000 marks. You can change the memory capacity for track and marks. **Note that when this is done all tracks and marks in the memory are erased.**

1. Press the [MENU] key followed by the soft keys CHART SETUP OPTIONS and TRACK CONTROL.
2. Press ▼ to select TRACK MEMORY.
3. Press the soft key EDIT to display the TRACK MEMORY window.

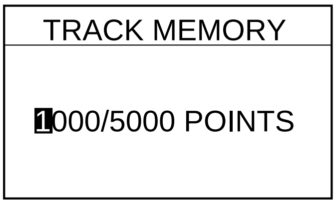


Figure 3-7 TRACK MEMORY window

The TRACK MEMORY window may be erased by pressing the soft key CANCEL to escape.

4. Enter number of track memory points desired with the alphanumeric keys.

   Note that all digits may be cleared by pressing the soft key CLEAR or the [CLEAR] key in entering track memory points.

5. Press the soft key ENTER or the [ENTER] key. The following window appears to ask you if you are sure to change the track memory capacity.

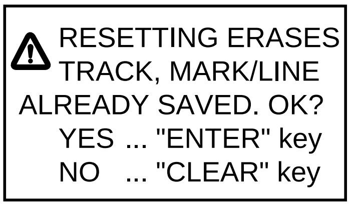


Figure 3-8 ERASE messege

6. Press the [ENTER] key to change apportion, or press the [CLEAR] key to escape.

3.6 Erasing All Track

You can erase all track. Be absolutely sure you want to erase all track; erased track cannot be restored.

1. Press the [MENU] key followed by the soft keys CHART SETUP OPTIONS and TRACK CONTROL.
2. Press the soft key ERASE TRACK. You are asked if you sure to erase all track.
3. Press the [ENTER] key to erase, or press the [CLEAR] key to escape.

4.1 Entering Marks

Select the fishing mode to enable entry of marks on the PLOTTER display. Select the location desired with the cursor, or turn off the cursor to enter the mark at own ship position. Pressing the [HIDE/SHOW] key changes the function of the soft keys. Press the soft key MARK ENTRY to enter the mark. The mark is entered in the shape and color selected from the MARK SHAPE and MARK COLOR windows.

In the FISHING mode, pressing the [HIDE/SHOW] key changes the function of the soft keys as follows.

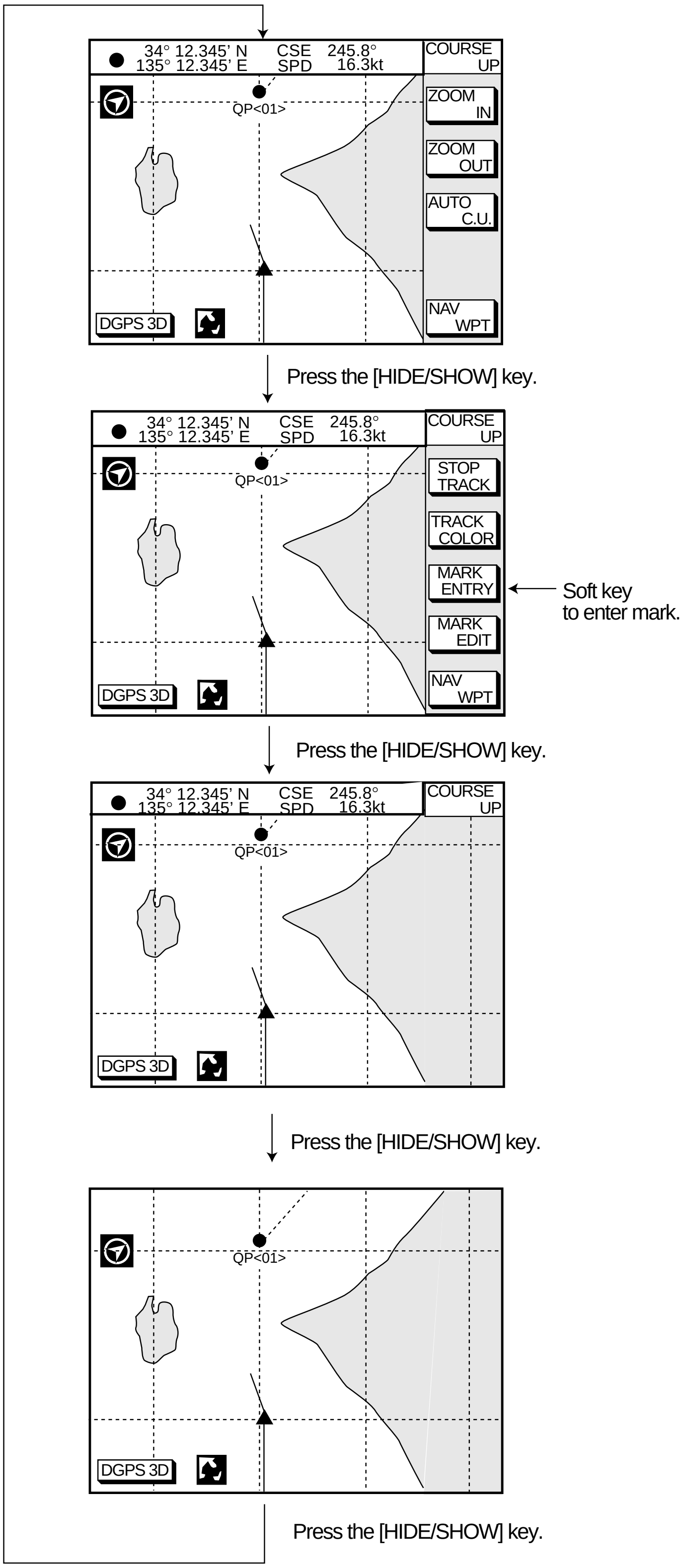


Figure 4-1 Changing Display

4.2 Changing Mark Attributes

You can select shape, line and color of mark/line on the TRACK display.

1. Press the [HIDE/SHOW] key to show the soft key MARK EDIT.
2. Press the soft key MARK EDIT to show the MARK/LINE window.

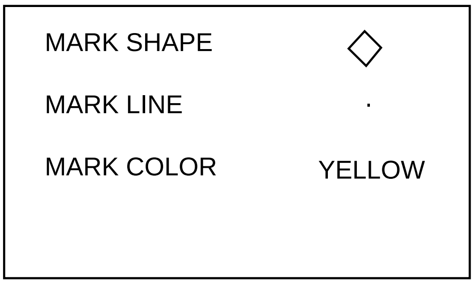


Figure 4-2 MARK/LINE window

3. Press the soft key MARK SHAPE to change mark shape, the soft key MARK LINE to change mark line, or the soft key MARK COLOR to change mark color.

   Mark shape

   Press the soft key MARK SHAPE to display the MARK SHAPE window. Press ▲ or ▼ to select mark shape desired.

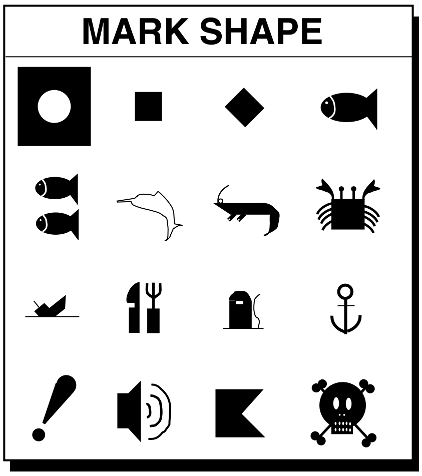


Figure 4-3 MARK SHAPE window

Mark line

Press the soft key MARK LINE to display the MARK LINE window. Press ▲ or ▼ to select mark line desired.

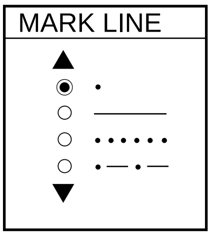


Figure 4-4 MARK LINE window

Mark color

Press the soft key MARK COLOR to display the MARK COLOR window. Press ▲ or ▼ to select mark color desired.

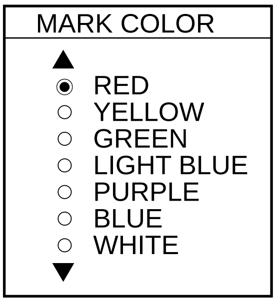


Figure 4-5 MARK COLOR window

4. Press the soft key ENTER or the [ENTER] key.
5. Press the soft key RETURN to finish.

Marks/lines entered hereafter are inscribed in the shape, color and line type selected here.

4.3 Changing Mark Size

Mark size can be selected from STD (standard) and SMALL.

1. Press the [MENU] key to display the main menu.
2. Press the soft key CHART SETUP OPTIONS.
3. Press the soft key CHART DETAILS to open the CHART DETAILS menu.

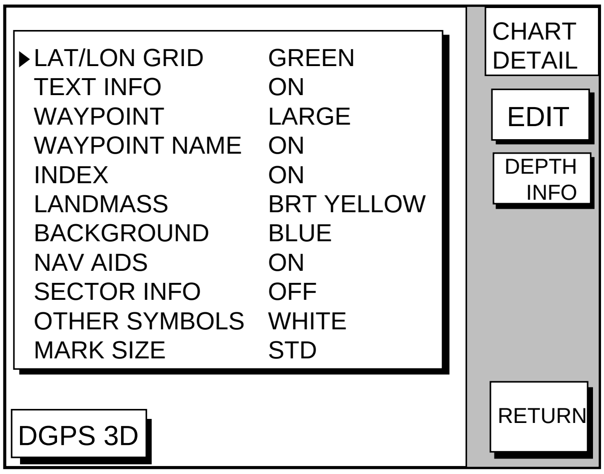


Figure 4-6 CHART DETAILS menu

4. Press ▼ to select MARK SIZE.
5 Press the soft key EDIT.
6. Press ▲ or ▼ to select STD (standard) or SMALL.
7. Press the [ENTER] key.

4.4 Erasing Marks

Erasing individual marks/lines

1. Operate the cursor pad to place the cursor on the mark you want to erase.
2. Press the [CLEAR] key. The mark selected is erased.

   Note: To erase line, place the cursor on a edge of the line. The line segment will be erased.

Erasing whole marks/lines

You can erase all marks and lines. Be absolutely sure you want to erase all marks and lines; erased marks and lines cannot be restored.

1. Press the [MENU] key followed by the soft keys CHART SETUP OPTIONS and TRACK CONTROL.
2. Press the soft key ERASE MARK. You are asked if you are sure to erase all marks and lines.
3. Press the [ENTER] key to erase, or press the [CLEAR] key to escape.

4.5 Displaying Track and Mark Points

Number of track and mark points used appears in the TRACK STATUS window on the TRACK CONTROL display. For further details see page 3-1.

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5.1 Entering Waypoints

In navigation terminology, a waypoint is a particular location on a voyage whether it be a starting, intermediate or destination point. A waypoint is the simplest piece of information your equipment requires to get you to a destination, in the shortest distance possible.

This unit has 835 waypoints (including quick waypoints) into which you can enter position information. There are five methods by which you can enter a waypoint: at own ship's position, at MOB position, by cursor, by range and bearing, and through the waypoint list (manual input of latitude and longitude).

Entering waypoints at own ship's position

You can save your current position as a waypoint. Press the [SAVE/MOB] key with a touch-and-release action to store your position. This new waypoint will automatically be saved in the waypoint list under the next consecutive waypoint number.

Entering waypoints at MOB position

The MOB mark functions to mark man overboard position.

1. Press the [SAVE/MOB] key several seconds to display the following message.

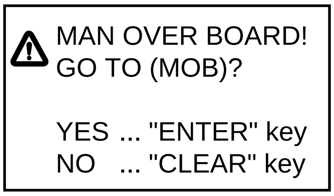

Figure 5-1 MOB message

2. Press the [ENTER] key to select MOB position as destination, or the [CLEAR] key to only mark MOB position.
3. To show range and bearing to the MOB position, press the soft key NAV L/L followed by the soft key NAV WPT.

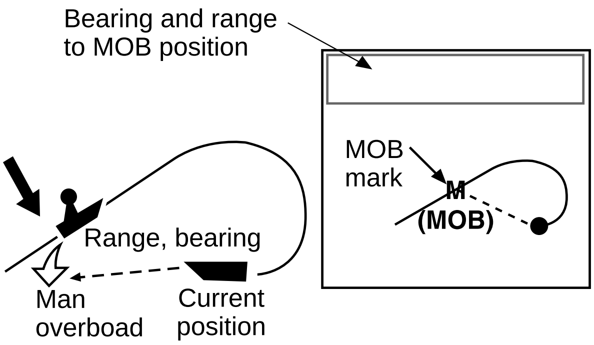

Figure 5-2 MOB concept

To erase a MOB mark, you must erase both the waypoint it is registered under and the MOB mark itself. Place the cursor on the MOB mark and press the [CLEAR] key followed by the [ENTER] key to erase the waypoint. (A flashing diamond appears over the waypoint when it has been correctly selected.) Repeat to erase the MOB mark.

Entering waypoints by the cursor

1. Press the [WPT/RTE] key to open the waypoint & route menu.

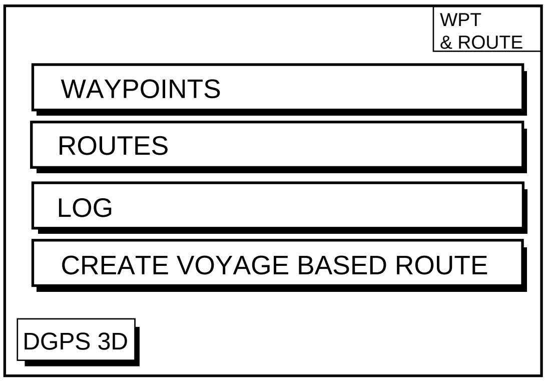

Figure 5-3 Waypoint & route menu

2. Press the soft key WAYPOINTS to display the waypoint menu.

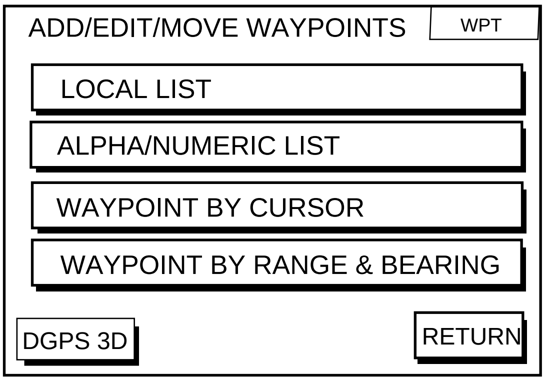

Figure 5-4 waypoint menu

3. Press the soft key WAYPOINT BY CURSOR. The plotter display appears.
4. Operate the cursor pad to place the cursor on the location desired.
5. Press the soft key NEW WPT. The waypoint window appears and it shows mark shape, waypoint name, comment (default: date), position of waypoint and proximity alarm radius.

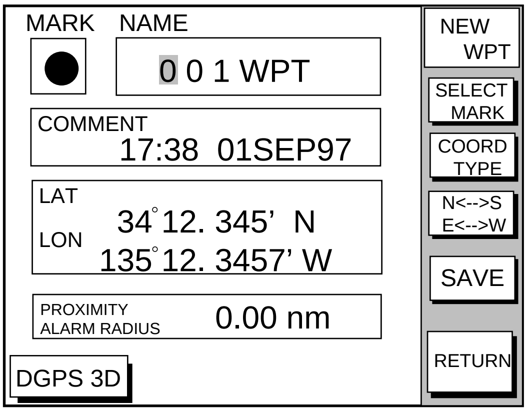

Figure 5-5 Waypoint window

6. If you do not need to change the waypoint data, simply press the soft key SAVE to register the waypoint and return to the plotter display. Be sure to press the soft key SAVE only after changing <u>all</u> data.

Changing the shape and color of waypoint mark

1. Press the soft key SELECT MARK.
2. Press the soft key MARK SHAPE to open the mark shape selection window.

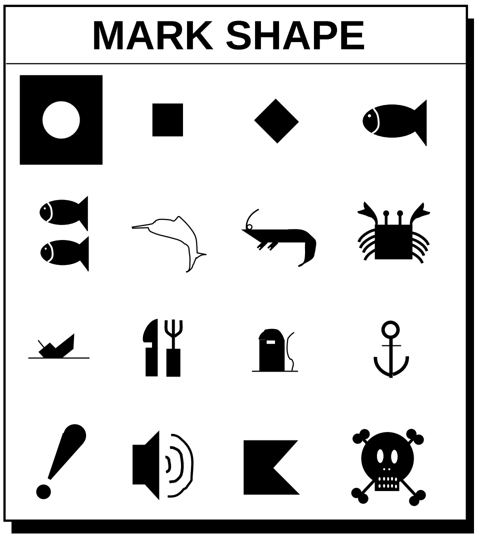

Figure 5-6 Mark shape selection window

3. Operate the cursor pad to select shape desired.
4. Press the soft key ENTER or the [ENTER] key.
5. Press the soft key SELECT MARK.
6. Press the soft key MARK COLOR to open the mark color selection window.

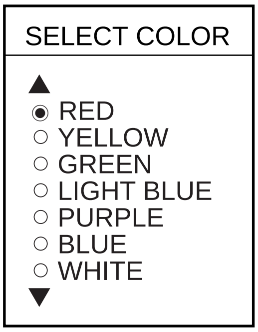

Figure 5-7 Mark color selection window

7. Press ▲ or ▼ to select the color desired, and then press the soft key ENTER or the [ENTER] key.

Changing waypoint name, comment, proximity alarm radius

1. If necessary, you can change the name (1 to 6 characters), comment (13 characters), L/L position and the proximity alarm radius (explained in detail in Chapter 8) as follows:
   a) Select the NAME, COMMENT or PROXIMITY ALARM RADIUS field.
   b) Use the cursor pad to select character or digit.
   c) Enter appropriate data with the alphanumeric keys.

Note: You cannot change shape and color of a waypoint when it has a proximity alarm radius entered. To change shape or color, enter all zeroes as the proximity alarm radius.

Changing waypoint position

1. Use the cursor pad to place the cursor in the LAT LON field.
2. Operate the cursor pad to place the cursor on digit to change. Enter appropriate data with the alphanumeric keys.
3. You can switch co-ordinates with the soft key N<-->S/E<-->W.

Entering waypoints by range and bearing

This method is useful when you want to enter a waypoint using range and bearing to a target found on a radar.

1. Press the [WPT/RTE] key to open the waypoint & route menu.
2. Press the soft key WAYPOINTS to open the waypoint menu.
3. Press the soft key WAYPOINT BY RANGE & BEARING. The plotter screen appears.

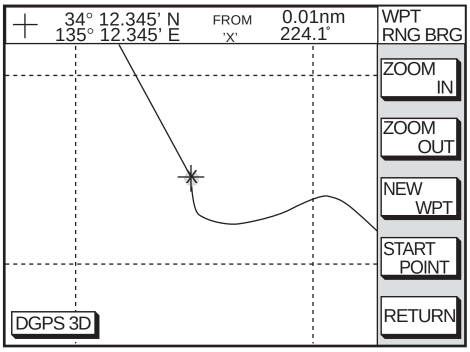

Figure 5-8 Plotter display, Range and bearing selected as waypoint entry method

4. Operate the cursor pad to place the cursor on the location desired. The range and bearing from own ship to cursor appear at the top of the screen.

   Note: The origin point of range and bearing can be shifted to the place you desire. Operate the cursor pad to select location, and then press the soft key START POINT. "X" appears at the cursor position.

5. Press the soft key NEW WPT. The screen should look something like the one shown in Figure 5-5.
6. If necessary, change data as you did in "Entering waypoints by the cursor."
7. Press the soft key SAVE to register the waypoint.

Entering waypoints by latitude and longitude position

1. Press the [WPT/RTE] key to open the waypoint & route menu.
2. Press the soft key WAYPOINTS to open the waypoint menu.
3. Press the soft key LOCAL LIST (lists waypoints in order from nearest to furthest) or ALPHA/NUMERIC LIST (lists waypoints in alphanumeric order).

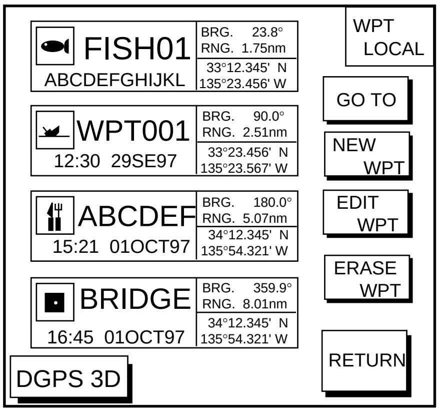

Figure 5-9 Local list

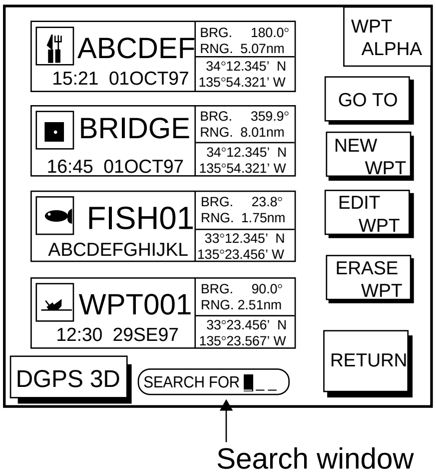

Figure 5-10 Alpha/numeric list

4. Press the soft key NEW WPT to show the waypoint window. Own ship's position is shown. Change the data similar to how you did in "Entering waypoints by the cursor."
5. Press the soft key SAVE.

5.2 Erasing Individual Waypoints

Individual waypoints can be erased by the cursor or through the waypoint list.

Erasing waypoints by the cursor

1. Press the cursor pad to turn on the cursor.
2. Operate the cursor pad to place the cursor on the waypoint you want to erase. A flashing diamond mark appears over the waypoint when it is correctly selected.
3. Press the [CLEAR] key. You are asked if you are sure to erase the waypoint.
4. Press the [ENTER] key. The waypoint is erased from both the plotter screen and the waypoint list.

Erasing waypoints through the waypoint list

1. Press the [WPT/RTE] key to open the waypoint & route menu.
2. Press the soft key WAYPOINTS to open the waypoint menu.
3. Press the soft key LOCAL LIST or ALPHA/NUMERIC LIST.
4. Press ▲ or ▼ to select the waypoint you want to erase.
5. Press the soft key ERASE WPT. You are asked if you are sure to erase the waypoint.
6. Press the [ENTER] key. The waypoint is erased from both the waypoint list and the plotter screen.

5.3 Changing Waypoint Data

You can change the waypoint data through the list.

1. Press the [WPT/RTE] key, soft key WAYPOINTS, and soft key LOCAL LIST or ALPHA/NUMERIC LIST.
2. Press ▲ or ▼ to select the waypoint you want to change.
3. Press the soft key EDIT WPT.
4. Change data as you did in "Entering waypoints by the cursor."
5. Press the soft key SAVE.

5.4 Waypoint Mark Size

You may change the size of all waypoint marks to small or large (default), or turn them off.

1. Press the [MENU] key to open the main menu.
2. Press the soft key CHART SETUP OPTIONS.
3. Press the soft key CHART DETAILS to open the CHART DETAILS menu.

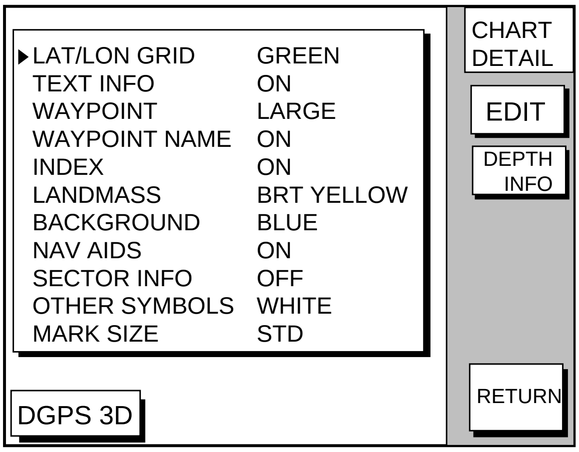

Figure 5-11 Chart details menu

4. Press ▲ or ▼ to select WAYPOINT.
5. Press the soft key EDIT.
6. Press ▲ or ▼ to select LARGE, SMALL or OFF. LARGE shows mark in actual shape. SMALL displays all waypoints with an “X” regardless of mark shape selected.
7. Press the soft key ENTER or [ENTER] key.

5.5 Changing Waypoint Position on the Plotter Display

You may change the latitude and longitude position of waypoints on the plotter display as follows:

1. Press the [WPT/RTE] key followed by the soft key WAYPOINTS to open the waypoint menu.
2. Press the soft key WAYPOINT BY CURSOR. The plotter display appears.
3. Operate the cursor pad to place the cursor on the waypoint which you want to change. A flashing diamond mark appears on the waypoint when it is correctly selected.
4. Press the soft key EDIT/MOVE.
5. Press the soft key MOVE WPT.
6. Operate the cursor pad to place the cursor on the location desired.
7. Press the [ENTER] key.

The waypoint moves to the cursor position and its new position is recorded on the waypoint list. If the waypoint is set as destination or is part of a route, you are asked if you are sure to move the waypoint. In this case, press the [ENTER] key again, or the [CLEAR] key to cancel move.

5.6 Searching Waypoints

You can search for a waypoint through the alpha/numeric list as follows:

1. Press the [WPT/RTE] key, and then press the soft keys WAYPOINTS and ALPHA/NUMERIC LIST to show the alpha/numeric list. At the bottom of the display the search window appears.

Figure 5-12 Search window

2. Use the alphanumeric keys to enter the first 1 - 3 characters in the search window. The waypoint searched appears at the top of the screen.

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Often a trip from one place to another involves several course changes, requiring a series of route points (waypoints) which you navigate to, one after another. The sequence of waypoints leading to the ultimate destination is called a route. Your unit can automatically advance to the next waypoint on a route, so you do not have to change the destination waypoint repeatedly.

You can store up to 200 routes. A route may consist of 35 points.

6.1 Entering Routes

Entering routes through the route list

This method constructs routes using existing waypoints.

1. Press the [WPT/RTE] key to open the waypoint & route menu.
2. Press the soft key ROUTES to open the route menu.

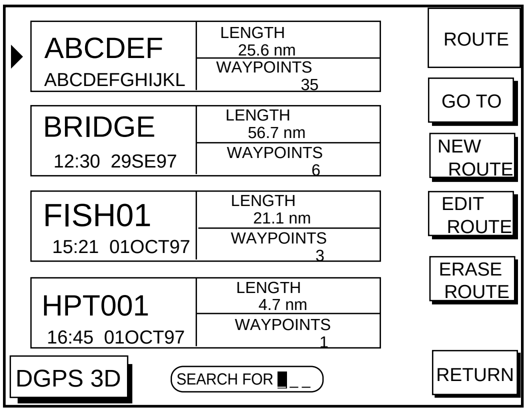

Figure 6-1 Route menu

3. Press the soft key NEW ROUTE to open the new route entry screen.

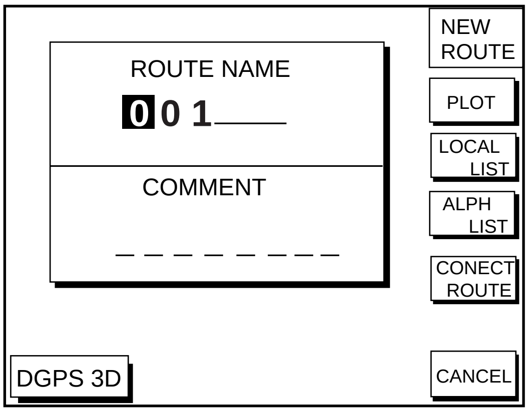

Figure 6-2 New route entry screen

4. If desired you can change the route name shown and/or add a comment. To change route name, press the [CLEAR] key to clear the route name. Use the cursor pad to locate the cursor and then press appropriate alphanumeric key. To enter a comment, place the cursor in the COMMENT window. Use the cursor pad and alphanumeric keys to enter your comment. A route name may consist of six characters; comment, 13 characters.
5. Press the soft key LOCAL LIST or ALPH LIST to open the waypoint list.
6. Press ▲ or ▼ to select a waypoint, and press the soft key ADD WPT to add it to the route.
7. Repeat step 6 to complete the route.

   When you want to clear a waypoint selected, press the soft key ERASE LST WP. Each pressing of this key deletes the last waypoint entered.
8. Press the soft key SAVE to register the route.

Entering routes by the cursor

This method allows you to construct a route directly on the plotter display, using existing waypoints or new locations. Any new location will be saved as a waypoint, under the next consecutive waypoint number.

1. Follow step 1-4 in "Entering routes through the route list."
2. Press the soft key PLOT. The plotter display appears.
3. Operate the cursor pad to place the cursor on an existing waypoint (soft key ADD WPT appears) or new location (soft key ADD NEW WPT appears).
4. Press the soft key ADD WP (ADD NEW WPT) key.
5. Repeat steps 3 and 4 to complete the route.
6. Press the [ENTER] key to register the route.

6.2 Connecting Routes

Two routes can be connected as follows:

1. Press the [WPT/RTE] key followed by the soft keys ROUTES and NEW ROUTE to open the new route menu.
2. Enter the name for new route.
3. Press the soft key CONECT ROUTE.
4. Enter the registered route name for the first route beneath FIRST in the CONNECT ROUTE window.

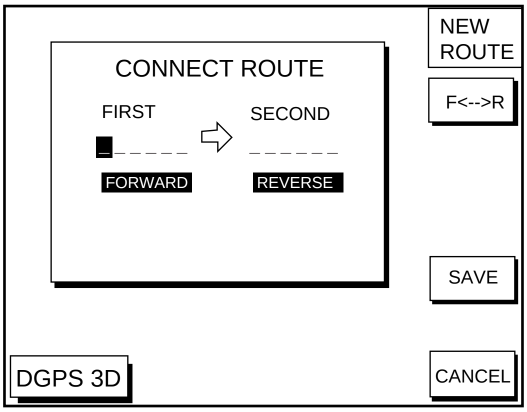

Figure 6-3 Connect route window

5. Press the soft key F<-->R to select direction to transverse the waypoints of the route.
7. Enter the route name of the second route similar to how you did for the first route.
8. Press the soft key SAVE.

Note: The maximum number of waypoints in a route is 35. If this number is exceeded an error message appears. In this case, if desired, delete waypoints in one or both routes so the total number of waypoints does not exceed 35.

6.3 Inserting, Removing Waypoints

Inserting waypoints through the route list

Waypoints can be inserted in routes as follows:

1. Press the [WPT/RTE] key followed by the soft key ROUTES to open the route menu.
2. Select a route by pressing ▲ or ▼.
3. Press the soft key EDIT ROUTE. The route name screen appears.
4. Press the soft key LOCAL LIST. All waypoints in the route are displayed.

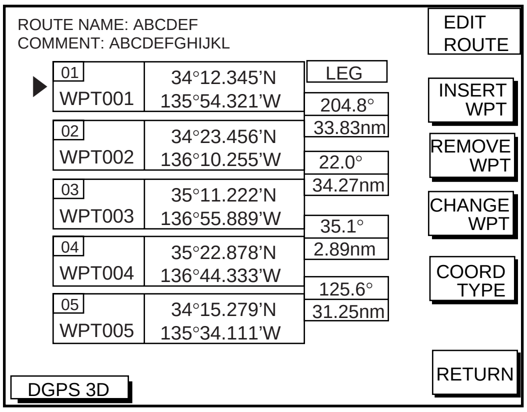

Figure 6-4 Edit route menu

5. Press ▲ or ▼ to place the cursor at the location where you want to insert a waypoint.
6. Press the soft key INSERT WPT to show the waypoint list.

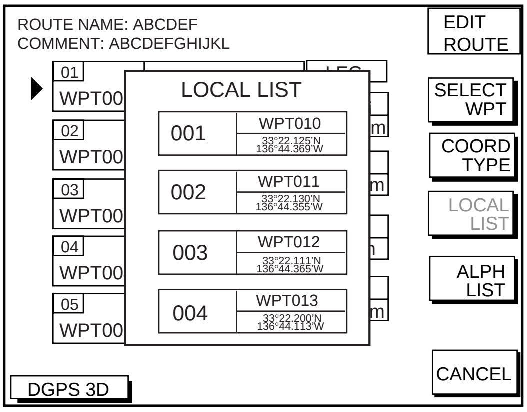

Figure 6-5 Waypoint list for editing a route (Local list)

7. Press ▲ or ▼ to select the waypoint you want to insert. You can switch between the local list and alphanumeric list by pressing the soft key LOCAL LIST or ALPH LIST.
8. Press the soft key SELECT WPT.

Inserting waypoints on the plotter display

Inserting waypoints before the first waypoint or after the last waypoint

1. Press the [WPT/RTE] key followed by the soft key ROUTES to open the route menu.
2. Press ▲ or ▼ to select the route desired.
3. Press the soft key EDIT ROUTE.
4. Press the soft key PLOT to show the plotter screen.
5. Operate the cursor to place the cursor on the waypoint which you want to insert.
6. Press the soft key ADD TO START.
7. Operate the cursor pad to place the cursor on an existing waypoint (soft key ADD WPT appears) or new location (soft key ADD NEW WPT appears).
8. Press the soft key ADD WPT (ADD NEW WPT).
9. Press the [ENTER] key.

When you want to insert waypoints after the last waypoint, press the soft key "ADD TO END" at the step 6.

Inserting waypoints in an intermediate location within a route

1. Follow steps 1 through 4 in "Inserting waypoints before the first waypoint or after the last waypoint."
2. Operate the cursor pad to place the cursor on a line connecting waypoints.
3. Press the soft key SPLIT LEG. The selected line turns red.
4. Operate the cursor pad to place the cursor on an existing waypoint (soft key INSERT WPT appears) or new location (soft key INSERT NEW WPT appears). Press the appropriate soft key.

Removing waypoints from routes

Removing route waypoints through the route list

1. Press the [WPT/RTE] key followed by the soft key ROUTES to open the route menu.
2. Press ▲ or ▼ to select the route desired.
3. Press the soft keys EDIT ROUTE and LOCAL LIST to show the waypoint list.
4. Press ▲ or ▼ to select the waypoint you want to delete.
5. Press the soft key REMOVE WPT.

Removing route waypoints from the plotter display

1. Press the [WPT/RTE] key followed by the soft key ROUTES to open the route menu.
2. Press ▲ or ▼ to select the route desired.
3. Press the soft key EDIT ROUTE.
4. Press the soft key PLOT to show the plot screen.
5. Operate the cursor pad to place the cursor on the waypoint you want to remove from the route.
6. Press the soft key REMOVE WPT.

6.4 Creating Track-based Routes

You can create routes based on your ship's track by entering waypoints at own ship's position. This feature is useful when you wish to retrace a track.

1. Press the [WPT/RTE] key to open the waypoint & route menu.
2. Press the soft key CREATE VOYAGE BASED ROUTE to show the save route menu.

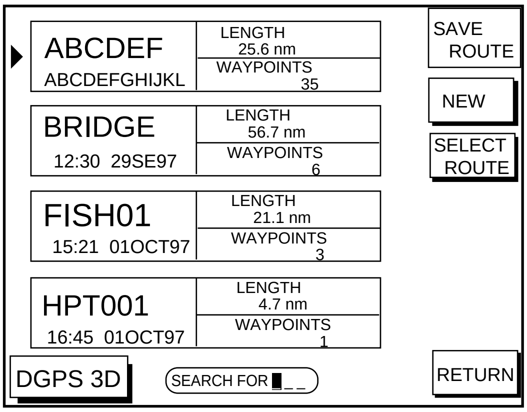

Figure 6-6 Save route menu

3. Press the soft key NEW to show the new route window.

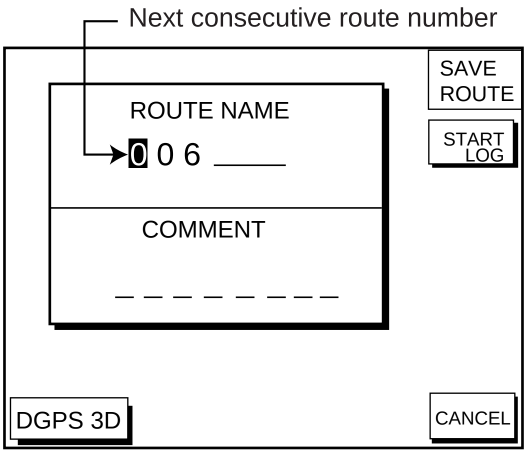

Figure 6-7 New route window

4. If required, you may change the route name and enter a comment, using the [CLEAR] key, cursor pad and alphanumeric keys.
5. Press the soft key START LOG to show the track-based route screen. If you entered an existing route name at step 4, you are asked if you want to add track-based waypoints to the existing route. Then, press the [ENTER] key to select YES, or the [CLEAR] key to escape.

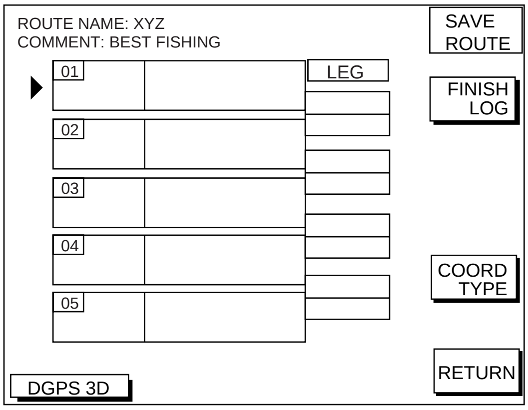

Figure 6-8 Route contents display

6. Press the [PLOT] key to show the plot display. The SAVE icon appears at the bottom of the screen.

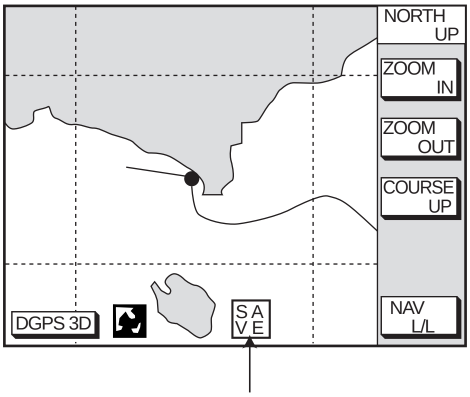

Figure 6-9 SAVE icon appearance on the plotter display

7. Press the [SAVE/MOB] key with a touch-and-release action to enter a waypoint mark at own ship position. A new waypoint is created under the next consecutive waypoint number and that waypoint is added to the route.
8. Repeat step 7 as necessary. 35 waypoints can be entered.
9. Press the [WPT/RTE] key followed by the soft key CREATE VOYAGE BASED ROUTE.
10. Press the soft key FINISH LOG to register the route. The SAVE icon disappears.

6.5 Erasing Routes

1. Press the [WPT/RTE] key followed by the soft key ROUTES to open the route menu.
2. Press ▲ or ▼ to select a route you want to erase.
3. Press the soft key ERASE ROUTE. You are asked if you are sure to erase the route.
4. Press the [ENTER] key to erase the route.

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7.1 Navigating to "Quick Points"

The "quick point" feature allows you to navigate to point(s) without retaining the data indefinitely in your unit's memory. Each time a quick point is entered the previous quick points having the same quick point numbers are written over.

Selecting quick point entry method

You need to tell your unit how to set the quick point: 1 POINT, 35 POINT (up to 35 points) or WPT/PORT SERV. (For WPT/PORT SERV, see the next page.)

1. Press the [MENU] key.
2. Press the soft key DISPLAY OPTIONS.
3. Select SET GO TO METHOD and press the soft key EDIT. The following display appears.

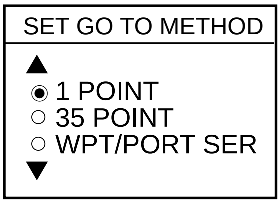

Figure 7-1 Set go to method window

4. Select method desired.
5. Press the soft key ENTER.
6. Press the soft key RETURN to finish.

Navigating to a single quick point

1. Select 1 POINT in the "selecting quick point entry method," and return to the plotter display.
2. Place the cursor on an existing waypoint (soft key GO TO WPT appears) or a new location (soft key GO TO CURSOR appears).
3. Depending on the selection you made at step two press the soft key GO TO CURSOR or GO TO WPT.

A light-blue line connects between own ship and destination, marked "QP<01>", and it shows the shortest course to the destination. Arrows on the line show the direction to follow to the quick point. Range and bearing from own ship to the destination appears at the top of screen. This location is saved to the waypoint list as waypoint "QP01."

Navigating to multiple quick points

1. Select 35 POINT in the "selecting quick point entry method," and return to the plotter display.
2. Press the soft key GO TO.
3. Place the cursor on an existing waypoint (soft key SELECT WPT appears) or a new location (soft key ADD QP appears).
4. Depending on the selection you made at step 3 press the soft key SELECT WPT or ADD QP. "QP<01>" appears at the cursor location. To erase last-entered waypoint press the soft key ERASE LST WPT.
5. Repeat steps 3 and 4 to complete.
6. Press the [ENTER] key to register the route.

A light-blue line connects between own ship and all quick points, and it shows the shortest course to destination. Arrows on the line show the direction to follow the route. Quick points are numbered in sequential order from QP<01> and are saved to the waypoint list. Range and bearing from own ship to the first destination appears at the top of screen. The unit saves the points as a route, under the name "Q>RTE" (Quick Route).

7.2 Navigating to Waypoints (waypoint list)

1. Press the [WPT/RTE] key to open the waypoint & route menu.
2. Press the soft key WAYPOINTS to open the waypoint menu.
3. Press the soft key LOCAL LIST or ALPHA/NUMERIC LIST to show corresponding waypoint list.
4. Select a waypoint.
5. Press the soft key GO TO. The plotter display appears. A light-blue line runs between destination selected and own ship's position. Arrows on the line show the direction to the follow. Waypoint data appear at the top of screen.

7.3 Navigating to Ports, Port Services

Some Nav-Charts™ mini chart cards have a port service list which shows services available at ports or harbors. (See page 2-4.) You can use the list to set destination as follows:

1. Press the [MENU] key to open the main menu.
2. Press the soft key DISPLAY OPTIONS.
3. Press ▼ to select SET GO TO METHOD and press the soft key EDIT. The SET GO TO METHOD window appears.
4. Press the ▲ or ▼ to select WPT/PORT SER and press the [ENTER] key or the soft key ENTER.
5. Press the [PLOT] key to return to the plotter display.
6. Press the soft key GO TO. Soft key titles change as in Figure 7-2.

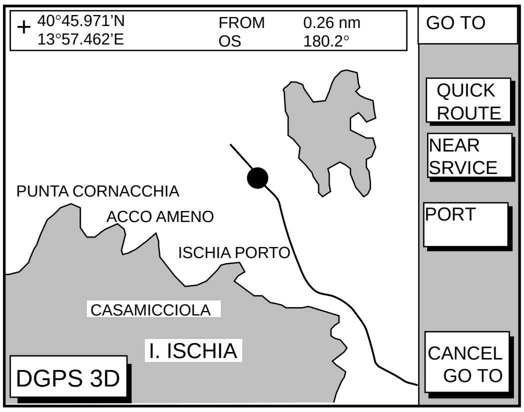

Figure 7-2 Plotter display

7. Press the soft key PORT or NEAR SRVICE soft key depending on objective. PORT shows a list of ports in your area. NEAR SRVICE displays the port service list.

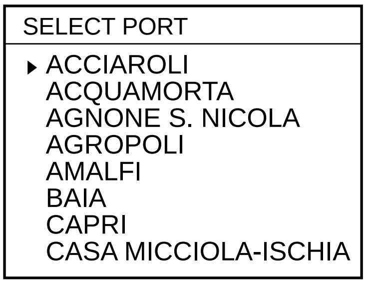

Figure 7-3 Sample port list (southern Italy)

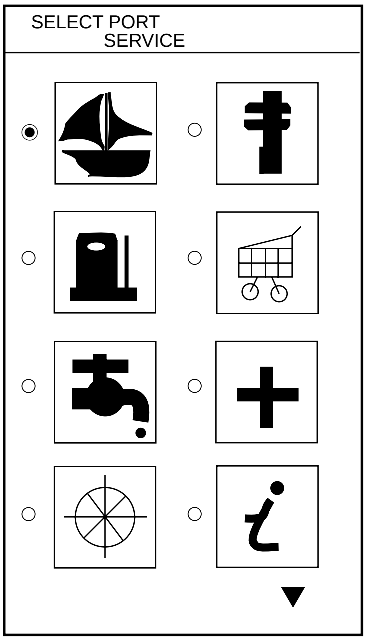

Figure 7-4 Sample port service list

8. **If you selected PORT in step 7,** use the cursor pad to select a port and press the [ENTER] key. Make a route using the soft keys and press the [ENTER] key. (If you want to go directly to that port, simply press the soft key ADD QP followed by the [ENTER] key.)

   If you selected NEAR SERVICE in step 7, select service mark desired and then press the soft key ENTER. Then, the display shows the locations of those services nearest you. (Figure 7-5 shows location of filling stations in an area in southern Italy.) Use ▲ or ▼ to place the "hand cursor" on the port service icon desired and press the soft key ENTER. Make a route using the soft keys and press the [ENTER] key. (If you want to go directly to location selected, simply press the soft key ADD QP followed by the [ENTER] key.)

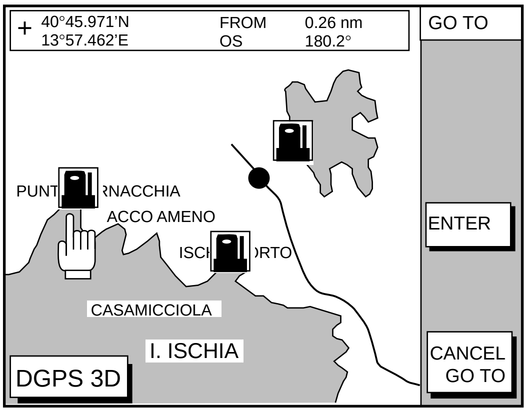

Figure 7-5 Sample filling station locations (southern Italy)

7.4 Following a Route

1. Press the [WPT/RTE] key followed by the soft key ROUTE to open the route list.
2. Press ▲ or ▼ to select a route.
3. Press the soft key GO TO to show the plotter display.

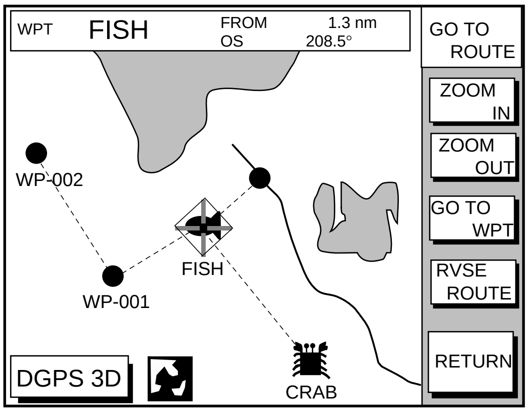

Figure 7-6 Plotter display, route selected as destination

The cursor is on the route waypoint nearest own ship.

4. Operate the cursor pad to place the cursor on the waypoint or leg desired in the route.
5. Press the soft key GO TO WPT or FOLLOW LEG (depending on the choice at step 4).

Green lines connect all route waypoints and arrows on the lines point in the direction to traverse the route.

Navigate route waypoints in reverse order

Press the soft key RVSE ROUTE to reverse the order to traverse waypoints. The arrows on the route line point in direction selected.

Navigate directly to a route waypoint

If you want to go directly to a route waypoint, place the cursor on the waypoint to show the flashing diamond, and then press the soft key GO TO WPT.

Navigate along specific leg of route

Place the cursor on the leg to display it in a white and red flashing line, and then press the soft key FOLLOW LEG.

Restarting navigation

When you steer to avoid an obstacle or the vessel drifts, you may go off your intended course (Line 1 in Figure 7-7). Use the steering or highway display to return to course.

Also, if you don't need to return to the original course, you can go directly to the waypoint (Line 2 in Figure 7-7) using the restart function as on the next page.

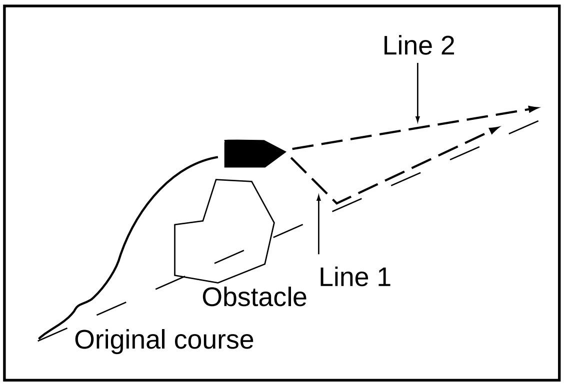

Figure 7-7 Example of when to restart navigation

1. Set a destination.
2. Press the [WPT/RTE] key to open the waypoint & route menu.
3. Press the soft key LOG.

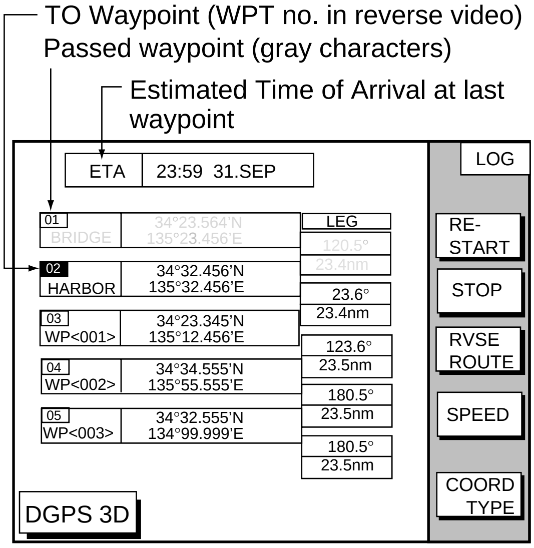

Figure 7-8 Log display

4. Press the soft key RESTART.

Setting speed for ETA calculation

Speed, which may be input manually or automatically, is required to calculate ETA (Estimated Time of Arrival) to a waypoint.

1. Press the [WPT/RTE] key to display the waypoint & route menu.
2. Press the soft key LOG.
3. Press the soft key SPEED.

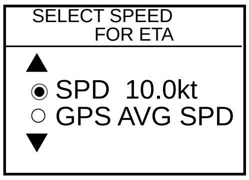

Figure 7-9 Select speed for ETA window

4. Key in speed manually in the SPD field, or use GPS speed data by selecting GPS AVG SPD.
5. Press the soft key ENTER to register your selection.

Switching waypoints

When you arrive to a waypoint on a route, you can switch to the next waypoint three ways: AUTO1, AUTO2 and MANUAL.

AUTO1: Automatically switches the TO waypoint when your boat is within the arrival alarm area. For how to set the arrival alarm area, see "8.3 Arrival Alarm" on page 8-1.

AUTO2: Automatically switches the TO waypoint when the boat enters the arrival alarm range or the boat passes an imaginary perpendicular line passing through the center of the destination waypoint.

MANUAL: When the boat enters the arrival alarm area, the TO waypoint may be switched by using the soft key RESTART (on the LOG display). If the arrival alarm is not set, the waypoint will not be switched. To be alerted when you arrive at a waypoint turn on the audio alarm. For further details, see "8.2 Audio Alarm On/Off" on page 8-1.

To select waypoint switching method do the following:

1. Press the [MENU] key.
2. Press the soft key DISPLAY OPTIONS.
3. Select WAYPOINTS SW.
4. Press the soft key EDIT to show the waypoint sw window.
5. Select appropriate waypoint switching method.
6. Press the soft key ENTER to close the window.

7.5 Cancelling Navigation

1. Press the [WPT/RTE] key.
2. Press the soft key LOG.
3. Press the soft key STOP.
4. Press the [ENTER] key to go stand by.
5. Press the soft key RELEASE.
6. Press the [ENTER] key.

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8.1 Introduction

There are five plotter-related alarms which generate both audible and visual alarms: Arrival alarm, Anchor Watch alarm, XTE (Cross Track Error) alarm, Proximity alarm, and Speed alarm.

When an alarm setting is violated the buzzer sounds, and the speaker icon ( ) appears in red. You may silence the alarm by pressing the [CLEAR] key. The icon remains on the screen until the cause of the alarm is removed or the alarm is deactivated.

8.2 Audio Alarm On/Off

The audio alarm sounds whenever an alarm setting is violated. You can enable or disable the audio alarm as follows:

1. Press the [ALARM] key to show the alarm menu.

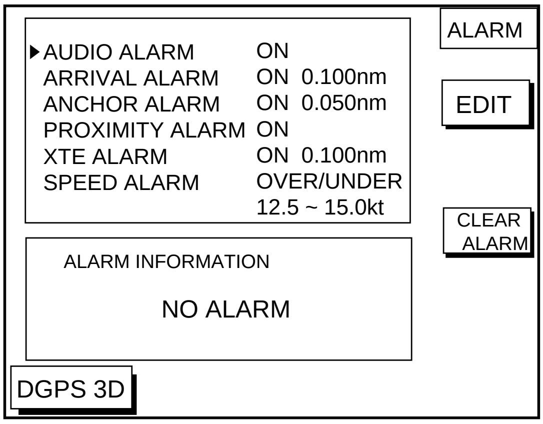

Figure 8-1 Alarm menu

2. Press ▲ or ▼ to select AUDIO ALARM.
3. Press the soft key EDIT to show the audio alarm window.

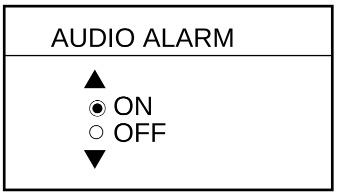

Figure 8-2 Audio alarm window

4. Press ▲ or ▼ to select ON or OFF.
5. Press the soft key ENTER or the [ENTER] key to register your selection.

8.3 Arrival Alarm

The arrival alarm informs you that your boat is approaching a destination waypoint. The area that defines an arrival zone is that of a circle which you approach from the outside of the circle. The alarm will be released if your boat enters the circle. When the arrival alarm is active a red dashed circle marks the arrival alarm area.

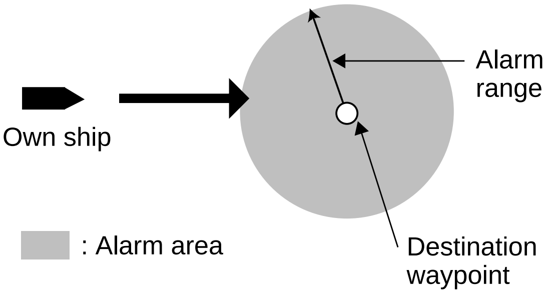

Figure 8-3 How the arrival alarm works

1. Press the [ALARM] key to open the alarm menu.
2. Press ▲ or ▼ to select ARRIVAL ALARM.
3. Press the soft key EDIT to show the arrival alarm window.

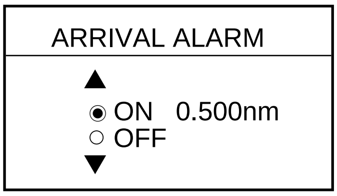

Figure 8-4 Arrival alarm window

4. Press ▲ to select ON.
5. Operate the cursor pad to place the cursor on the digit desired.
6. Key in the alarm range desired. The arrival alarm range is 0.001 to 9.999 miles.
7. Press the soft key ENTER or the [ENTER] key.

8.4 Anchor Watch Alarm

The anchor watch alarm informs you that your boat is moving when it should be at rest. When the anchor watch is active, a red dashed circle marks the anchor watch area.

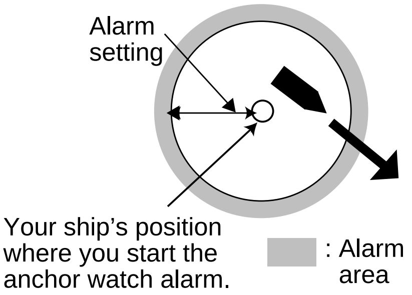

Figure 8-5 How the anchor watch alarm works

1. Press the [ALARM] key to open the alarm menu.
2. Press ▲ or ▼ to select ANCHOR ALARM.
3. Press the soft key EDIT to open the anchor alarm window.

```
ANCHOR ALARM
▲
◉ ON   0.050nm
○ OFF
▼
```

Figure 8-6 Anchor watch alarm window

4. Press ▲ to select ON.
5. Key in the alarm range desired. The anchor watch range is 0.001 to 9.999 miles.
6. Press the soft key ENTER or the [ENTER] key to register your selection.

8.5 XTE (Cross Track Error) Alarm

The XTE alarm warns you when your boat is off its intended course. When the XTE alarm is active two red dashed lines mark the XTE alarm area.

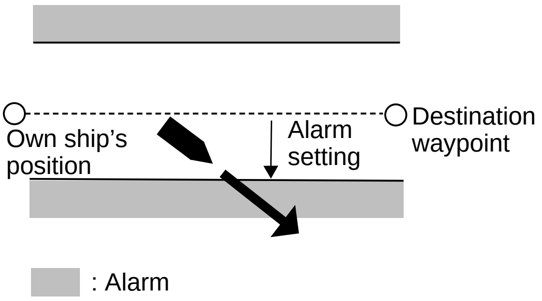

Figure 8-7 How the XTE alarm works

1. Press the [ALARM] key to open the alarm menu.
2. Press ▲ or ▼ to select XTE ALARM.
3. Press the soft key EDIT to open the XTE alarm window.

```
XTE ALARM
▲
◉ ON   0.100nm
○ OFF
▼
```

Figure 8-8 XTE alarm window

4. Press ▲ or ▼ to select ON.
5. Key in the alarm range desired. The XTE alarm range is 0.001 to 9.999 miles.
6. Press the soft key ENTER or the [ENTER] key to register your selection.

8.6 Speed Alarm

The speed alarm warns when your boat's speed is within, over/under or under the speed range set.

1. Press the [ALARM] key to open the alarm menu.
2. Press ▲ or ▼ to select SPEED ALARM.
3. Press the soft key EDIT to display the speed alarm window.

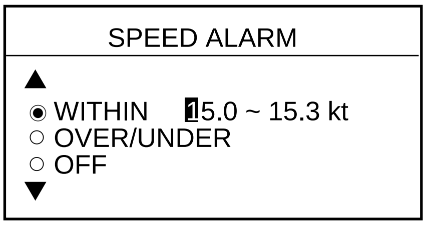

Figure 8-9 Speed alarm window

4. Press ▲ or ▼ to select WITHIN, OVER/UNDER, or OFF.
5. Key in the alarm range desired.
6. Press the soft key ENTER or the [ENTER] key to finish.

8.7 Proximity Alarm

The proximity alarm alerts you when your vessels nears a waypoint by the distance set for that waypoint on the waypoint list. You can globally activate or deactivate the proximity alarm here. Waypoints whose proximity alarm is active have a (∅) mark near them.

1. Press the [ALARM] key to open the alarm menu.
2. Press ▲ or ▼ to select PROXIMITY ALARM.
3. Press the soft key EDIT to show the proximity alarm window.

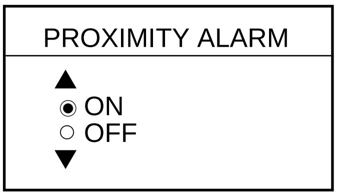

Figure 8-10 Proximity alarm window

4. Select ON or OFF by the cursor pad.
5. Press the soft key ENTER or the [ENTER] key to register your selection.

8.8 Alarm Information

When an alarm setting has been violated the buzzer sounds and the speaker icon (shown in red) appears. You can see which alarm has been violated, as well as silence the buzzer, on the alarm menu display.

1. Press the [ALARM] key.

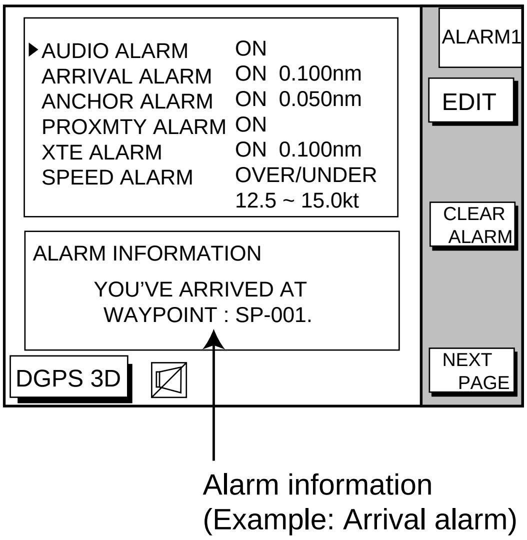

Figure 8-11 Alarm menu

2. Press the soft key CLEAR ALARM to silence the buzzer. The color of alarm message and the speaker icon may change from red to black.

Note: The speaker icon is displayed in red until all alarms have been acknowledged on the alarm menu display. If more than one alarm has been violated the message CONTINUE appears at the bottom of the display. In this case press the soft key NEXT INFO to see which other alarms have been violated.

Alarm messages

Table 8-1 Alarm messages and their meanings

Message	Meaning
YOU'VE ARRIVED AT WAYPOINT.	Arrival alarm setting violated.
YOU HAVE EXCEEDED ANCHOR WATCH LIMIT.	Anchor watch alarm setting violated.
YOU'VE ENTERED AN AVOIDANCE AREA.	Proximity alarm setting violated.
YOU HAVE EXCEEDED XTE LIMIT.	XTE alarm setting violated.
YOU HAVE EXCEEDED SPEED ALARM LIMIT.	Speed alarm setting violated.

9. SAVING AND LOADING DATA TO/FROM MEMORY CARD

The following data can be saved to memory card:

- Mark/line
- Waypoints/routes
- Track
- Configration (menu settings)

9.1 Formatting Memory Cards

Before you can use a memory card it must be formatted. Note that formatting a used card erases all saved data.

1. Insert the memory card you want to format into the slot.
2. Press the [MENU] key followed by the soft keys CONFIGRATION and UPLOAD/ DOWNLOAD DATA.

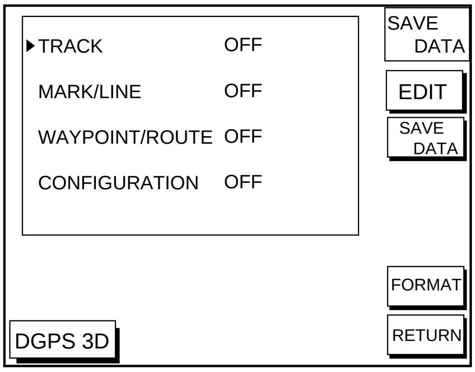

Figure 9-1 SAVE DATA display

3. Press the soft key SAVE DATA TO MEMORY CARD and the soft key FORMAT. You are asked if you are ready to format the memory card.
4. Press the [ENTER] key to format (or press the [CLEAR] key to escape). Now FORMATTING MEMORY CARD appears. Do not remove the card while it is being formatting. When the formatting is completed, FORMAT COMPLETED appears.
5. Press the [ENTER] key to finish. Now you can record data to the memory card.

Note: Chart cards cannot be formatted.

9.2 Saving Data to Memory Card

The memory card can save four items of data; track, mark/line, waypoint/route and configuration.

Saving data

1. Insert a formatted memory card into the slot.
2. Press the [MENU] key followed by the soft keys CONFIGURATION and UPLOAD/ DOWNLOAD DATA.
3. Press the soft key labeled SAVE DATA TO MEMORY CARD. The SAVE DATA display (Figure 9-1) appears.
4. Press ▲ or ▼ to select item to save.
5. Press the soft key EDIT to open the TRACK, MARK/LINE, WAYPOINTS/ ROUTES or CONFIGRATION window.
6. Press ▲ to select ON.
7. Press the soft key ENTER or the [ENTER] key.
8. Repeat from steps 4 to 7 to save other data if desired.
9. Press the soft key SAVE DATA. The following message appears and saving starts. Do not remove the memory card while data is being saved.

NOW SAVING DATA TO MEMORY CARD. DO NOT TURN OFF THE POWER UNTIL SAVING COMPLETED.

Figure 9-2 SAVE DATA message

When saving is completed, COMPLETE SAVING DATA appears.

10. Press the [ENTER] key.

Error message

Memory card not inserted

Press the [ENTER] key to return to the SAVE DATA display.

MEMORY CARD NOT
INSERTED. INSERT CARD
PRESS "ENTER" key
TO CONTINUE.

Figure 9-3 NOT INSERTED message

Unformatted memory card

Press the [ENTER] key to return to the SAVE DATA display. And format it refering to the previous page.

MEMORY CARD NOT
FORMATTED
PRESS "ENTER" key
TO CONTINUE.

Figure 9-4 NOT FORMATTED message

Wrong card inserted

Appears when a chart card is inserted. Press the [ENTER] key to return to the SAVE DATA display. Replace it with a formatted memory card.

WRONG CARD INSERTED.
INSERT MEMORY CARD.
PRESS "ENTER" key
TO CONTINUE.

Figure 9-5 WRONG CARD message

Data overwrite

Data type to be recorded exists on memory card. (Two or more of same data type cannot be recorded.) Press the [ENTER] key to overwrite same data type on the card, or press the [CLEAR] key to escape.

⚠ OVERWRITE FOLLOWING
DATA. OK?
(TRACK)
YES ... "ENTER" key
NO ... "CLEAR" key

Figure 9-6 OVERWRITE message

9.3 Loading Data from Memory Card

Data (track, marks, waypoints, configuration) can be loaded from a memory card and displayed on the screen. This feature is useful for observing past data and setting up the equipment for a specific purpose (with “configuration”).

1. Press the [MENU] key followed by the soft keys CONFIGURATION and UPLOAD/DOWNLOAD DATA.
2. Press the soft key LOAD DATA FROM MEMORY CARD to show the LOAD DATA display.

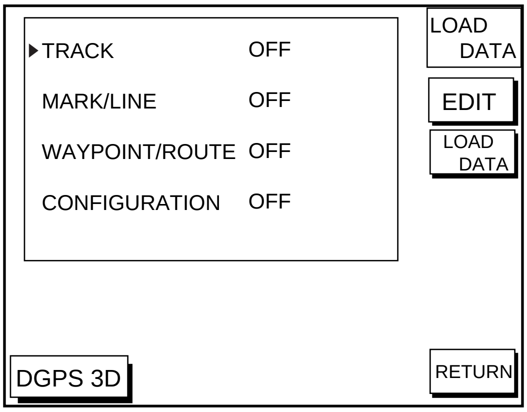

Figure 9-7 LOAD DATA display

3. Press ▲ or ▼ to select item to load.
4. Press the soft key EDIT to show the ON/OFF selection window.
5. Press ▲ to select ON. Press the soft key ENTER or the [ENTER] key. If the memory card does not contain the item selected, the buzzer sounds and ON cannot be selected.

6. After you select all items desired, press the soft key LOAD DATA to load data. The following message appears.

NOW LOADING DATA FROM MEMORY CARD. DO NOT TURN OFF THE POWER UNTIL LOADING COMPLETE.

Figure 9-8 LOAD DATA message

After loading is completed, the following message appears.

COMPLETE LOADING DATA. PRESS "ENTER" KEY TO CONTINUE.

Figure 9-9 COMPLETE message

7. Press the [ENTER] key.

Note on loading data

Track

Since loaded track data is added to internal track, oldest track will be entered when the track memory capacity is exceeded.

Waypoint/route

The loaded data substitutes for previously stored.

Mark/line

The loaded data is added to internal data. When the mark/line memory becomes full no marks may be entered.

Configuration

The loaded data replaces current configuration settings. Press the [ENTER] key to restart. If the memory card is ejected while loading or data could not be loaded, press the [ENTER] key to restart with default settings. Note that track memory capacity is not saved or loaded.

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10. CUSTOMIZING YOUR UNIT

This section describes the various options which allow you to set up your unit to suit your needs.

10.1 CHART SETUP OPTIONS menu

The chart offset options menu provides three menus: chart offset, track control, and chart details.

1. Press the [MENU] key to open the main menu.
2. Press the soft key CHART SETUP OPTIONS.

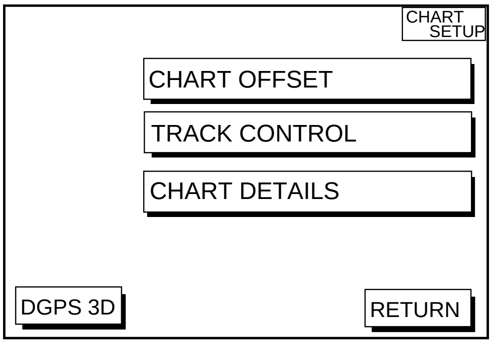

Figure 10-1 Chart setup options menu

CHART OFFSET menu

In some instances position may be off by a few minutes. For example, the position of the ship is shown to be at sea while it is in fact moored at a pier. You can compensate for this error by offsetting chart position as follows:

1. Press the [MENU] key followed by the soft keys CHART SETUP OPTIONS and CHART OFFSET.

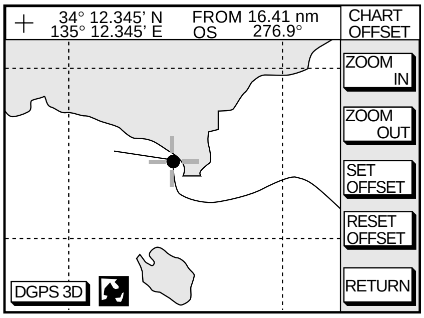

Figure 10-2 Plotter display, chart offset selected

2. Use the cursor pad to place the cursor where to offset chart position.
3. Press the soft key SET OFFSET.
4. Press the soft key RETURN to finish.

To cancel chart offset, press the soft key RESET OFFSET at step 3 in the above procedure.

TRACK CONTROL menu

This menu mainly controls track color and track plotting interval. For further details see Chapter 3.

CHART DETAILS menu

1. Press the [MENU] key followed by the soft keys CHART SETUP OPTIONS and CHART DETAILS.

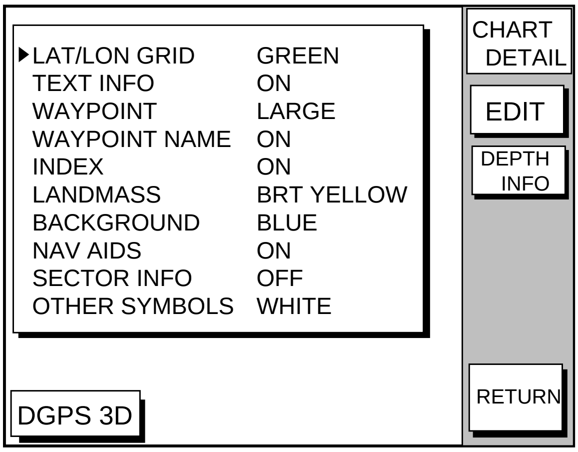

Figure 10-3 Chart details menu

2. Use the cursor pad to select item and press the soft key EDIT.
3. Select option with cursor pad and press the soft key RETURN to finish.

Chart details menu description

LAT/LONG GRID: Turns lat/long grid on/off and changes its color. The default settings are ON and green.

TEXT INFO: Turns geographic name display on/off. The default setting is ON.

WAYPOINT: Turns waypoint on or off and selects size to large or small. “LARGE” displays waypoint in shape selected; “SMALL” shows waypoints as an X regardless of actual shape. “OFF” only display waypoints when they are used in navigation. The default setting is LARGE.

WAYPOINT NAME: Turns waypoint name on/off. The default setting is ON.

INDEX: Turns chart indices on/off. The default setting is ON.

LANDMASS: Selects brightness and color of landmass. The default settings are bright and yellow.

BACKGROUND: Select background color to black or blue (default setting).

NAV AIDS: Turns aids to navigation symbols (for example, buoys) on/off. The default setting is ON. When OFF is selected, symbols are displayed and information is not.

SECTOR INFO: Turns lighthouse viewable angle indication on FURUNO charts on/off. Viewing angle is shown as an arc extending from lighthouse position. Arc color, white or green, is the color of the light beam. This feature is available with selected charts. The default setting is ON.

OTHER SYMBOLS: Selects color of all other chart symbols. The default setting is white.

DEPTH INFO soft key: Turns depth info display on/off and sets it color.

10.2 DISPLAY OPTIONS menu

This menu contains items for setting up the plotter display.

1. Press the [MENU] key.
2. Press the soft key DISPLAY OPTIONS. The display setup1 menu appears.

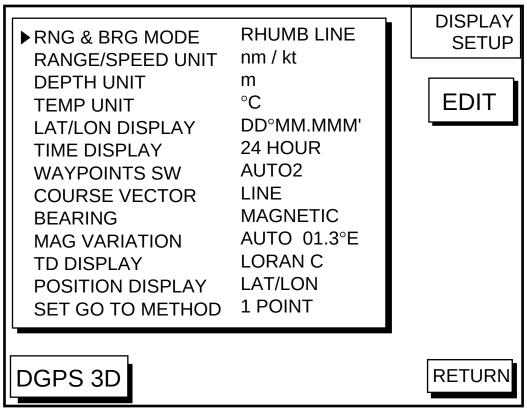

Figure 10-4 Display setup menu

Display setup menu description

RNG & BRG MODE

The GPS receiver calculates the range, bearing, cross track error (XTE) and ETA to TO waypoint when you set a destination. The range and bearing can be calculated by GREAT CIRCLE (straight line between two points) or RHUMB LINE (straight line between two points on nautical chart, default setting) method.

RANGE/SPEED UNIT

Selects the unit for range and speed; nm/kt (default setting), km/ km/h, sm/ sm/h.

DEPTH UNIT

Selects unit of depth measurement among, feet, fathoms, and meters. The default setting is feet.

TEMP UNIT

Selects unit of water temperature measurement between Celsius or Fahrenheit. The default setting is Fahrenheit.

LAT/LON DISPLAY

Displays the seconds of latitude and longitude positions in hundredths, thousandths (default setting) or ten thousandths.

TIME DISPLAY

Selects time display format for 12 hour or 24 hour (default setting).

WAYPOINT SW

Provides automatic or manual waypoint switching when following a route. For further details, see page 7-4. The default setting is AUTO2.

COURSE VECTOR

You may extend a line from the own ship position to show ship's course. The line can be a vector (the length depends on the ship's speed.) or a line (course bar). The default setting is LINE.

BEARING

A navigation device outputs both true and magnetic bearings. A magnetic bearing is true bearing plus (or minus) earth's magnetic deviation. Thus the equation for finding magnetic bearing is;

true bearing $\pm$ x (magnetic variation)° = magnetic bearing

You can display your ship's course and bearing to waypoint in true or magnetic bearing, and the default setting is magnetic.

MAG VARIATION

The magnetic variations for all areas of the earth are preprogrammed into this unit. The preprogrammed variation is accurate for most instances, however you may wish to manually enter a variation.

1. Select MAG VARIATION, and press the soft key EDIT to show the mag variation window.

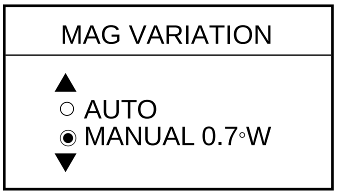

Figure 10-5 Mag variation window

2. Select MANUAL.
3. Key in magnetic deviation value.
4. Press the soft key W<-->E to switch between East and West and vice versa, if necessary.
5. Press the soft key ENTER or the [ENTER] key to finish.

TD DISPLAY

Position may be shown in Loran C TDs (default setting), Decca TDs, or latitude and longitude. To display position in TDs select Loran C or Decca here and choose TD at "POSITION DISPLAY" below. You can select the Loran C or Decca chain to use on the TD SETUP menu. For details see "TD SETUP menu" on page 10-6.

POSITION DISPLAY

Displays position in latitude and longitude (default setting) or Loran C or Decca TDs.

SET GO TO METHOD

Selects the method for entering the quick point: 1 POINT (default setting), 35 POINT (2-35 points), or WPT/PORT SER. For further details see pages 7-1 and 7-2.

OPERATION MODE

Selects the operation mode between PLEASURE and FISHING.For further details see page 2-8.

10.3 GPS/DGPS/TD OPTIONS menu

This menu sets up GPS and DPGS receivers and enables display of position in Loran C or Decca TDs.

1. Press the [MENU] key.
2. Press the soft key GPS/DGPS/TD OPTIONS to display the GPS/DGPS/TD options menu.

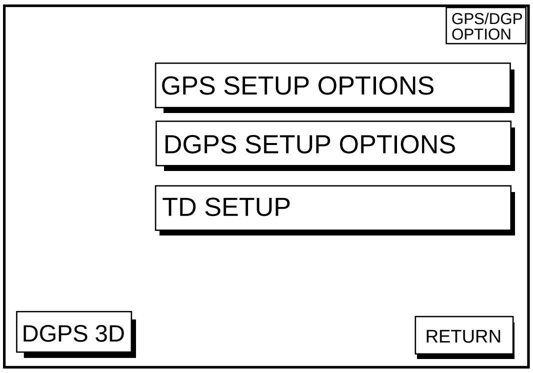

Figure 10-6 GPS/DGPS/TD options menu

GPS SETUP OPTIONS menu description

This menu provides items for setting up the GPS receiver. To display it, show the menu shown in Figure 10-6, and then press the soft key GPS SETUP OPTIONS.

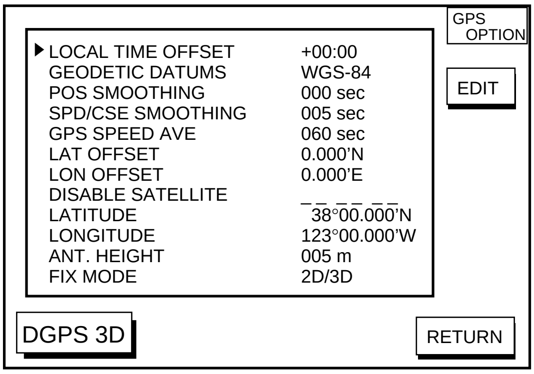

Figure 10-7 GPS SETUP options menu

LOCAL TIME OFFSET

GPS uses UTC time. If you would rather use local time, enter the time difference between local time and UTC time. Use the soft key +<-->- to switch from plus to minus and vice versa.

GEODETIC DATUM

The GP-1850D, GP-1850 is preprogrammed with most of the major chart systems of the world. Although the WGS-84 system, the GPS standard, is now widely used other categories of charts still exist. Select the chart system used, not the area where your boat is sailing. The default chart system is WGS-84.

1. Select GEODETIC DATUMS.
2. Press the soft key EDIT to show the geodetic datum window.

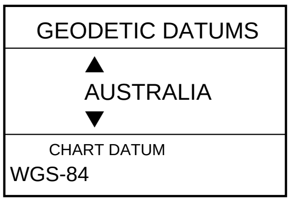

Figure 10-8 Geodetic datum window

3. Press ▲ or ▼ to select the chart system you are using. If no chart datum exists for geodetic datum selected UNKNOWN appears in the CHART DATUM window. In this case select a different chart system.
4. Press the soft key ENTER or the [ENTER] key to register your selection.

POS SMOOTHING

When the DOP or receiving condition is unfavorable, the GPS fix may change greatly, even if the vessel is dead in water. This change can be reduced by smoothing the raw GPS fixes. A setting between 000 to 999 is available. The higher setting the more smoothed the raw data, however too high a setting shows response time to change in latitude and longitude. This is especially noticeable at high ship's speeds. 000 is the normal setting; increase the setting if the GPS fix changes greatly.

SPD/CSE SMOOTHING

During position fixing, ship's velocity (speed and course) is directly measured by receiving GPS satellite signals. The raw velocity data may change randomly depending on receiving conditions and other factors. You can reduce this random variation by increasing the smoothing. Like with latitude and longitude smoothing, the higher the speed and course smoothing the more smoothed the raw data. If the setting is too high, however, the response to speed and course change slows. For no smoothing, enter all zeroes. The default setting is 5 (sec).

GPS SPEED AVE

Calculation of ETA is based on average ship's speed over a given period. If the period is too long or too short calculation error will result. Change this setting if calculation error occurs. The default setting is 60 seconds, which is suitable for most conditions.

LAT OFFSET, LON OFFSET

GPS generated position may be off by some seconds due to GPS signal variation. You may apply an offset to GPS position to refine position accuracy.

DISABLE SATELLITE

Every GPS satellite is broadcasting abnormal satellite number(s) in it's Almanac, which contains general orbital data about all GPS satellites, including those which are malfunctioning. Using this information, the GPS receiver automatically eliminates any malfunctioning satellite from the GPS satellite schedule. However, the Almanac sometimes may not contain this information. If you hear about a malfunctioning satellite from another source, you can disable it manually. Enter satellite number (max. 3 satellites) in two digits and press the soft key ENTER or the [ENTER] key.

LATITUDE, LONGITUDE

The default latitude and longitude position is San Francisco, USA (38.00.00'N, 123.00.000'W). When the unit is turned on first the first time it begins searching for its actual position. To lessen the time required to find position, you may enter your position manually. To switch from North to South and vice versa, use the soft key N<-->S, and to switch from West to East and vice versa, use the soft key W<-->E. Finally, press the soft key ENTER or the [ENTER] key.

ANT. HEIGHT

Enter the height of the antenna unit above sea surface. For further details refer to the installation manual. The default setting is 5 m.

FIX MODE

You can choose the position-fixing mode from 2D or 2D/3D. 2D requires three satellites to fix position; 2D/3D requires three or four satellites, whichever is available. The default setting is 2D/3D.

DGPS SETUP OPTIONS menu

This menu sets parameters for the DGPS beacon receiver. (GP-1850D, or GP-1850 equipped with DGPS beacon receiver.) To display it, press the [MENU] key followed by the soft keys GPS/DPGS/TD OPTIONS and DGPS SETUP OPTIONS.

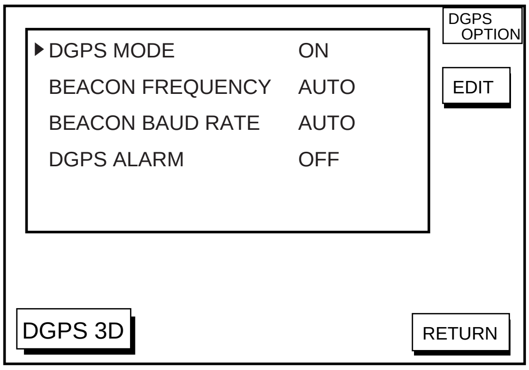

Figure 10-9 DGPS setup options menu

DGPS MODE

Select ON to use the DGPS mode. The default setting is ON. A DGPS beacon receiver must be connected to use this mode.

BEACON FREQUENCY

DGPS reference station can be searched automatically or manually. For manual search, select MANUAL here, and use the cursor pad to select frequency of DGPS reference station. The default setting is AUTO.

BEACON BAUD RATE

Selects the transmission rate of the DGPS reference station nearest you, among AUTO (default setting), 50, 100 or 200 bps. This setting is only effective when the DGPS mode is "manual"; baud rate cannot be changed in automatic DGPS mode.

DGPS ALARM

Enable/disable the DGPS alarm. When enabled, the audio alarm sounds three times if position cannot be found with DGPS. The default setting is ON.

TD SETUP menu

This menu selects the Loran C or Decca chain to use to display position in TDs. To display it, press the [MENU] key followed by the soft keys GPS/DPGS/TD OPTIONS and TD SETUP.

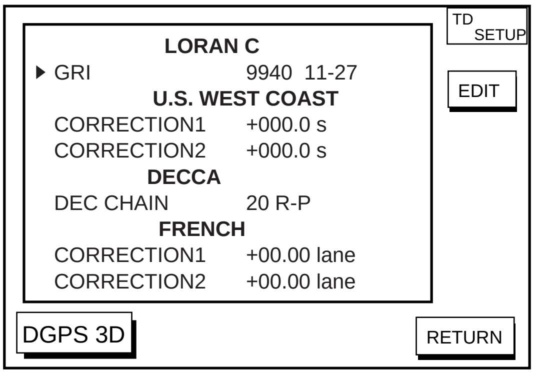

Figure10-10 TD setup menu

Displaying LORAN C TDs

1. Select GRI and press the soft key EDIT to show the GRI & sta. pair window.

Figure 10-11 GRI & sta. pair window

2. Press ▲ or ▼ to select GRI code. Press ▶ to enable selection of station pair, and then press ▲ or ▼ to select station pair. See the Loran C chain list at the end of this manual for GRI and station pairs.
3. Press the soft key ENTER or the [ENTER] key to register your selection.
4. If necessary, you may enter a position offset to refine Loran C position. Select LORAN C CORRECTION1 or CORRECTION2 and press the soft key EDIT. Enter correction value and press the soft key ENTER or the [ENTER] key. Use the soft key + <--> - to switch from plus to minus and vice versa.

Displaying DECCA TDs

1. Select DEC CHAIN and press the soft key EDIT to show the chain sta. pair window.

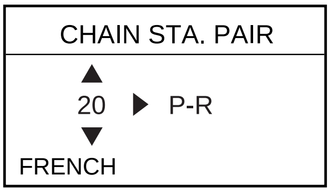

Figure 10-12 Chain sta. pair window

2. Press ▲ or ▼ to select Decca chain number. Press ▶ to enable selection of lane, and then press ▲ or ▼ to select lane pair (R: red, G: green and P: purple). Refer to the Decca chain list at the end of this manual.
3. Press the soft key ENTER or the [ENTER] key to register your selection.
4. If necessary, you may enter position offset to refine Decca position. Select DECCA CORRECTION1 or CORRECTION2 and press the soft key EDIT. Enter correction value and press the soft key ENTER or the [ENTER] key. Use the soft key + <--> - to switch from plus to minus and vice versa.

10.4 CONFIGURATION menu

The configuration menu has facilities for setting up data ports, uploading/downloading data, self test, demonstration mode setup, and memory clearing.

1. Press the [MENU] key.
2. Press the soft key CONFIGURATION to display the configuration menu.

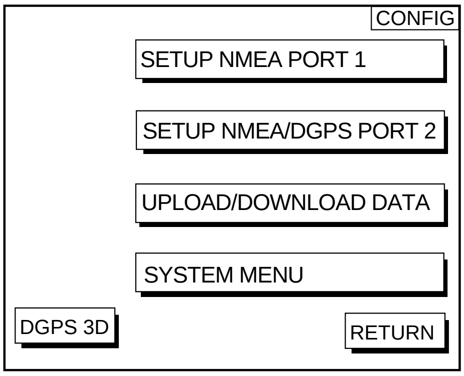

Figure 10-13 Configuration menu

SETUP NMEA PORT 1 menu description

This menu sets up DATA PORT 1 according to the specifications of the equipment connected to it. The menu can be displayed by pressing the [MENU] key followed by the soft keys CONFIGURATION and SETUP NMEA PORT 1. For detailed information, see the installation manual.

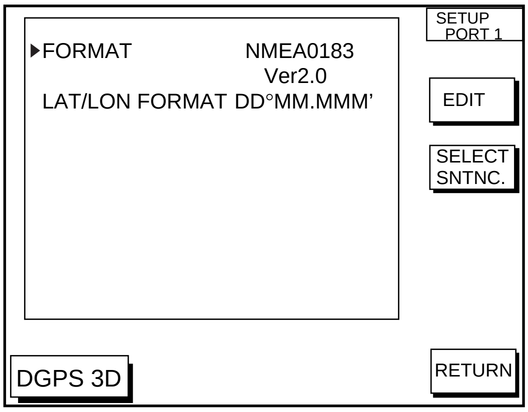

Figure 10-14 Setup NMEA port 1 (or 2) menu

FORMAT

Selects NMEA0183 version 1.5 or 2.0. If you are unsure of the version of external equipment try both and choose the one which outputs data correctly. The default setting is version 2.0.

LAT/LON FORMAT (GGA only)

Selects the seconds of latitude and longitude positions in hundredths, thousandths or ten thousandths.

Soft key SELECT SNTNC

This key enables/disables input/output of data sentences.

SETUP NMEA/DGPS PORT 2 menu description

This menu should be set according to the specifications of the equipment connected to connectors PORT 1 (NMEA) and PORT 2 (DGPS) at the rear of the display unit. The menu can be displayed by pressing the [MENU] key followed by the soft keys CONFIGURATION and SETUP NMEA PORT 2. For detailed information, see the installation manual.

FORMAT

Selects data format of connected equipment; NMEA0183 version 1.5, version 2.0, RTVM104 (EXTRN), RTCM104 (INTRN) or RTCM104 (OUTPUT). RTCM104 (INTRN) is for GP-1850D only. The default setting is RTVM104 (EXTRN).

The procedure for setting LAT/LON FORMAT are similar to those for PORT 1. Note that you cannot setup data sentences when you select RTCM104 (INTRN) as the format. (A level converter (IF-1432) is required when using NMEA0183 format.)

LAT/LON FORMAT (GGA only)

Selects the seconds of latitude and longitude positions in hundredths, thousandths or ten thousandths.

UPLOAD/DOWNLOAD DATA menu

This menu allows you to upload waypoint and route data to a PC or download the same data from a PC, via the DGPS connector at the back of display unit. The menu can be displayed by pressing the [MENU] key followed by the soft keys CONFIGURATION and UPLOAD/DOWNLOAD DATA. For detailed information, see the installation manual.

For memory card, see chapter 9.

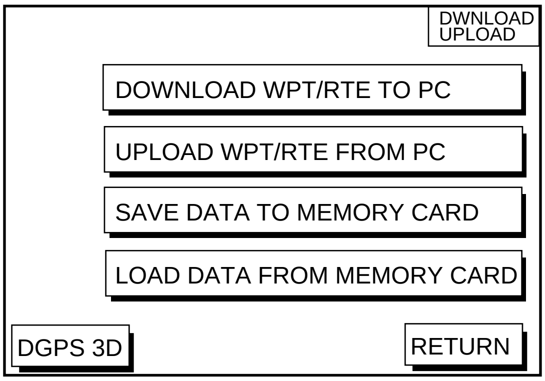

Figure 10-15 Upload/download menu

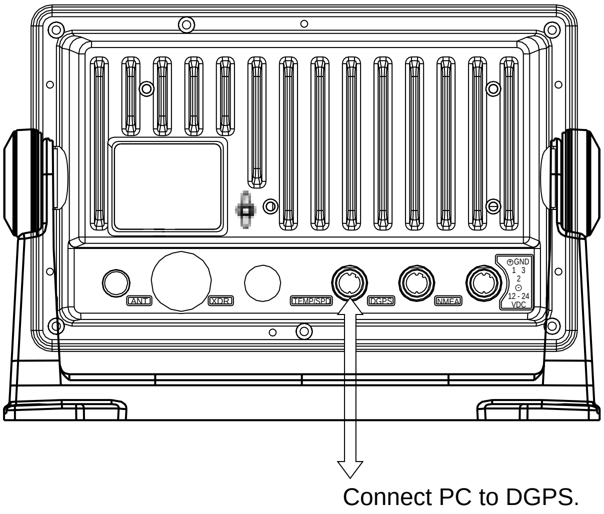

Figure 10-16 Display unit, rear view

Set communication software on the PC as follows:

Baud Rate:	4800 bps
Character Length:	8 bit
Stop bit:	1 bit
Parity:	None
X Control:	XON/XOFF

The following data can be downloaded/uploaded between a personal computer and this equipment.

- Waypoint data (In alphanumeric order)
- Route data (In order of route number)
- End of sentence

Note 1: There are two kinds of data for route data: route data and route comment data.

Note 2: DGPS position fix is not available when uploading or downloading data.

Download waypoint/route to PC

1. Connect the PC to the equipment as shown below.
2. Press the soft key labeled DOWNLOAD WPT/RTE TO PC. You are asked if you are ready to download waypoints and routes.
3. Press the [ENTER] key to download.

Upload waypoint/route from PC

Note that all waypoint and route data stored in your unit will be deleted when data is uploaded.

1. Connect the PC to the equipment as shown below.
2. Press the soft key labeled UPLOAD WPT/RTE FROM PC. You are asked if you are ready to upload waypoints and routes.
3. Press the [ENTER] key to upload.

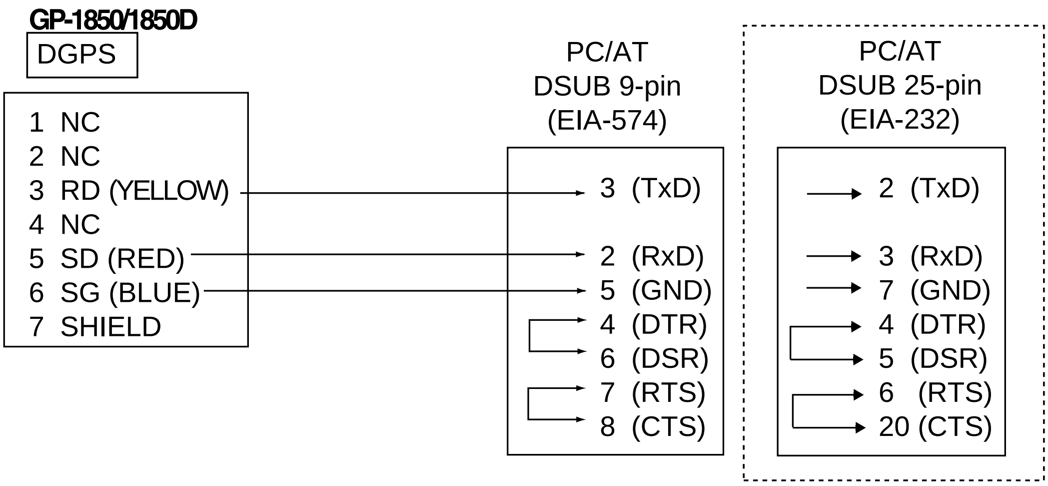

Figure 10-17 Connection of GP-1850D/GP-1850 to PC

Waypoint data format

```
PFEC, GPwpl, llll.llll, a, yyyyy.yyy, a, c----c, c, c----c, a <CR><LF>
                1       2      3      4    5     6    7     8
```

Figure 10-18 Waypoint data format

1: Waypoint latitude

2: N/S

3: Waypoint longitude

4: E/W

5: Waypoint name (Number of characters is fixed to 6 and space code is placed when the number of characters are less than 6.)

6: Waypoint color

7: Waypoint comment (1 byte for mark code + 13 characters of comment.)

1st byte of mark code: Fixed to ‘@’.

2nd byte of mark code: Internal mark code. See Note 1.

8. Information of marking waypoint. Always set to “A”.

“A”: Displayed

“V”: Not displayed

Note 1: Following characters can be used for comments:

_ABCDEFGHIJKLMNOPQRSTUVWXYZ0123456789&'#

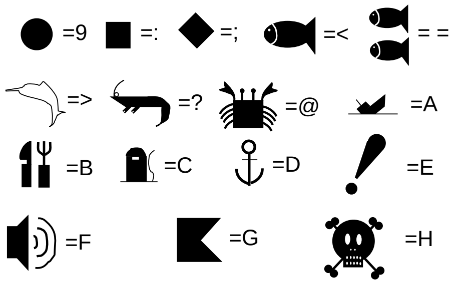

Figure 10-19 Character available for comment

Route data menu

```
$GPRTE, x, x, a, ccc, c----c, c----c, ... , c----c <CR><LF>
        1  2  3   4     5       6             12
```

Figure 10-20 route data format

1: Number of sentences required for one complete route data (1 to 4). See Note 2.

2: Number of sentences currently used (1 to 4)

3: Message mode (Always set to C)

4: Route No. (001 to 300, 3 digits required)

5 through 12: Waypoint name (Max. 8 names, length of each waypoint name is fixed to 7 byte)

Note 2: A route can may contain 35 waypoints and GPRTE sentence for one route data may exceed 80 byte limitation. In this case, route data is divided into several GPRTE sentences (Max. 4 sentences). This value shows the number of sentences the route data has been divided.

Route comment data format

```
$PFEC, GPrtc,  xx, c----c <CR><LF>
               1     2
```

Figure 10-21 Route comment format

1: Route No. (01 to 200, 3 digits required)

2: Route comment (Max. 16 characters, variable length)

The same characters of the comment for waypoint comment can be used.

End of sentence

```
$PFEC, GPxfr,  CTL, E <CR><LF>
```

Figure 10-22 End of sentence

SYSTEM menu

This menu provides testing facilities, demonstration mode setup and memory/trip clear. You may display it by pressing the [MENU] key followed by the soft keys CONFIGURATION and SYSTEM MENU.

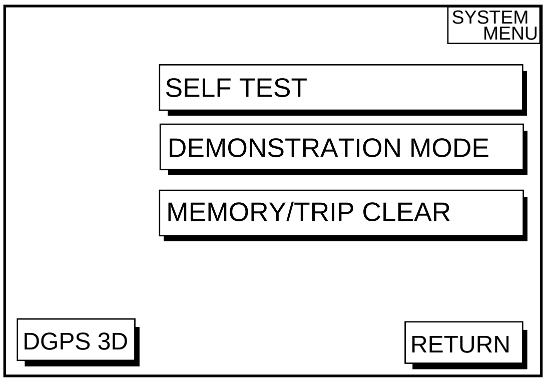

Figure 10-23 System menu

SYSTEM MENU description

SELF TEST, MEMORY/TRIP CLEAR: SELF TEST and MEMORY/TRIP CLEAR are described in Chapter11.

DEMONSTRATION MODE: This sets the parameters for the demonstration display. For further details see page 1-6.

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The GP-1850D/1850 C-MAP NT series uses FURUNO mini chart card and C-MAP NT-FP chart card. These charts show accurate coastlines, depth contours, place names, aids to navigation such as buoys and lighthouses, and other navigational marks.

11.1 Inserting Chart Card

Insert an appropriate chart card before turning on the power.

1. Push down the lid catch to open the chart card slot cover.

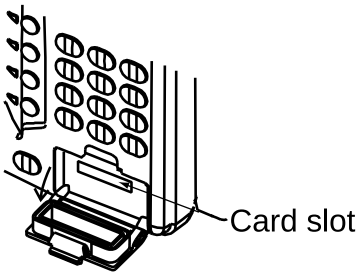

Figure 11-1 Location of chart card slot cover

2. Insert appropriate chart card groove side up.
3. Close the slot cover to protect the chart drive. (Keep the slot cover closed at all times.)

Note1: Turn off the power before inserting or ejecting the chart card.

Note2: When using C-MAP NT-FP card, do not eject it while a chart is being drawn. This may cause the equipment to stop working.

11.2 Cursor and Data Display

Besides its fundamental functions of providing position data, the cursor can also show caution area, depth area, source of data, etc. Further, you can display information about an icon by placing the cursor on it.

1. Press the cursor pad to turn the cursor on.

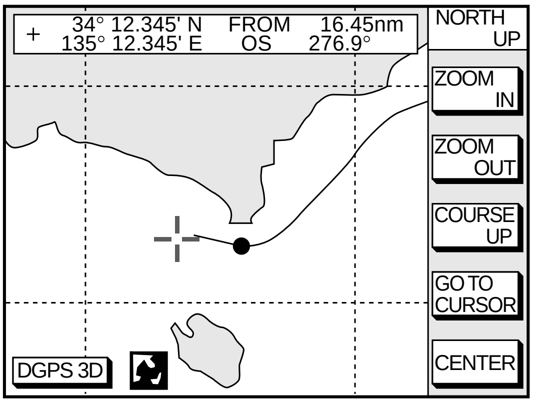

Figure 11-2 Plotter display

2. Use the cursor pad to place the cursor on the position desired.
3. Press the [ENTER] key to open the Objects window. For example the following window appears.

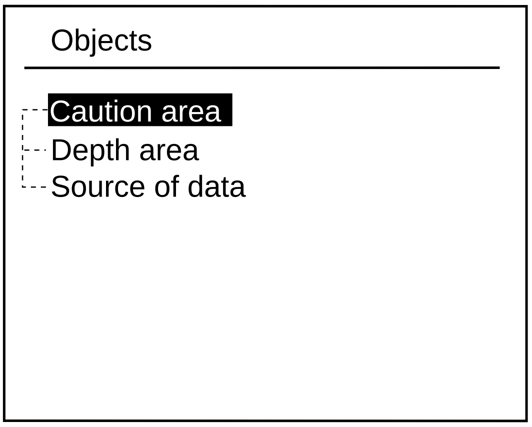

Figure 11-3 Objects window

4. Press ▲ or ▼ to select the item desired.
5. Press the soft key ENTER or the [ENTER] key to display details for object selected Objects.

Caution area

Information

LEUCHTFEUER DIE KARTE ENTHAEL T NUR DIE LAGEN DER WICHTIGEN FEUER. LIGHTS ONLY THE PRINC IPAL LIGHTS ARE SHOWN ON THIS CHART. MISSWEISUNG SIEHE K ARTEN GROESSEREN MASSSTABS. M AGNETIC VARIATION LOCAL MAGNE TIC ANOMALIES SEE LARGER SCAL E CHARTS.

Figure 11-4 Example of caution area window

6. Press the soft key CANCEL to close the window.
7. Repeat step 4 to 6 to select other item.
8. Press the soft key CANCEL to close the Objects window.

When you place the cursor on any icon, its information appears.

1. Place the cursor on a lighthouse icon.

Place the cursor
on a lighthouse icon.

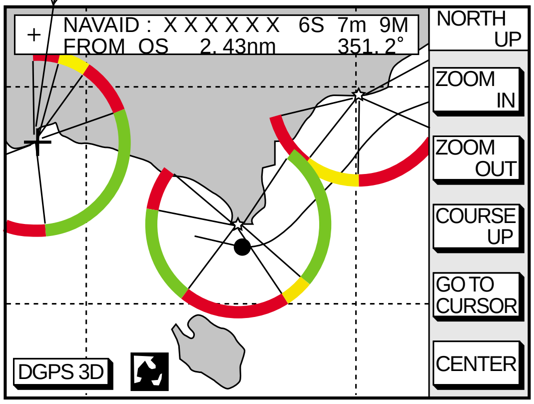

Figure 11-5 Lighthouse icon

2. Press the [ENTER] key. For example, the following window appears.

Objects

- Navigation mark, fixed
  - Extended navigational aid, ge
  - Light
  - Light
  - Light
  - Light
- Depth contour
- Land area
- Source of data

Figure 11-6 Object windows

3. Press ▲ or ▼ to select the item desired.
4. Press the [ENTER] key to display detailed information.

Navigation mark, fixed
Light.

Color
white
Height
7. 00 Meters
Light characteristic
occulting
XXXXXXXX
XXXXXXXX

Figure 11-7 Sample lighthouse data

5. Press the soft key CANCEL to close the Objects window.

11.3 Tidal Information

The C-MAP NT-FP chart card provides for calculation of the tide heights for any date. Additionally it displays the times of sunrise and sunset.

1. Press the cursor pad to place the cursor on a Tide icon.

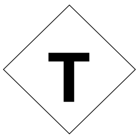

Figure 11-8 Tide icon

2. Press the [ENTER] key to open the Objects window.

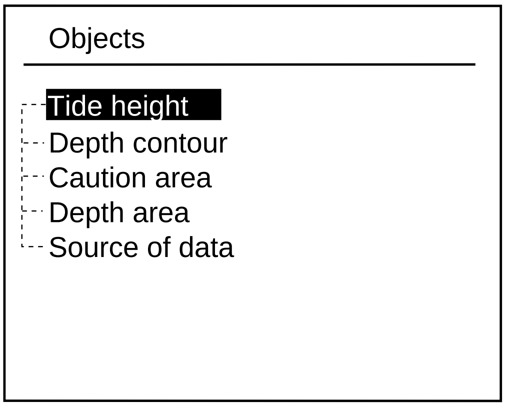

Figure 11-9 Objects window

3. Press ▲ or ▼ to select Tide height.
4. Press the soft key ENTER or the [ENTER] key to open the TIDE window.

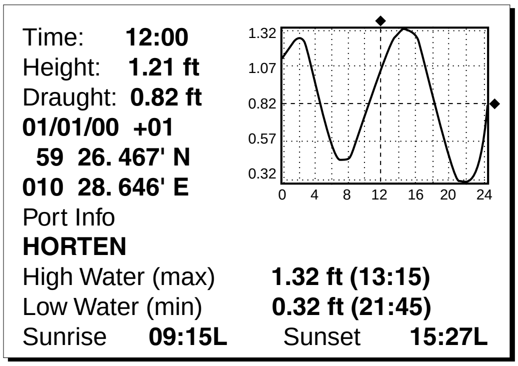

Figure 11-10 TIDE window

5. Press the soft key DATE to open the DATE window.

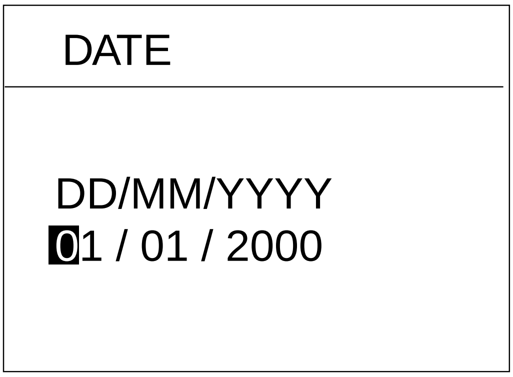

Figure 11-11 DATE window

6. Use ◀ or ▶ to position the cursor where desired and then press the appropriate numeric keys to enter a date.
7. Press the soft key ENTER or the [ENTER] key to show the tidal graph for entered date.
8. Press ◀ or ▶ to locate the vertical cursor on the time desired. Time and height are shown to the left of the graph.
9. Press ▲ or ▼ to shift the level cursor. Draught is shown to the left of the graph.
10. Press the soft key CANCEL to close the TIDE window.

11.4 Navigating to Ports, Port Services

The C-MAP NT-FP chart provides detailed information on aids to navigation (buoy, lighthouse) and port service information that you specify with the cursor. The port service information includes the availability of water and fuel supplies, shipyards and first aid, etc. You can use the list to set destination as follows:

1. Press the [MENU] key to open the main menu.
2. Press the soft key DISPLAY OPTIONS.
3. Press ▼ to select SET GO TO METHOD and press the soft key EDIT. The SET GO TO METHOD window appears.

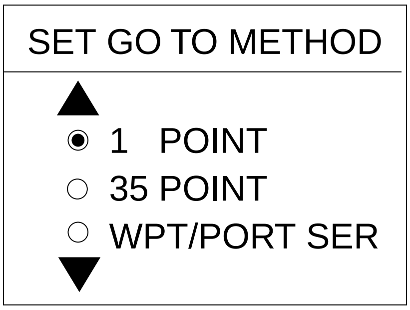

Figure 11-12 SET GO TO METHOD window

4. Press ▼ to select WPT/PORT SER and press the soft key ENTER or the [ENTER] key.
5. Press the [PLOT] key once or twice to return the plotter display.

6. Press the soft key GO TO. Soft key titles change as in Figure 11-10. If GO TO key is not displayed, press the cursor pad.

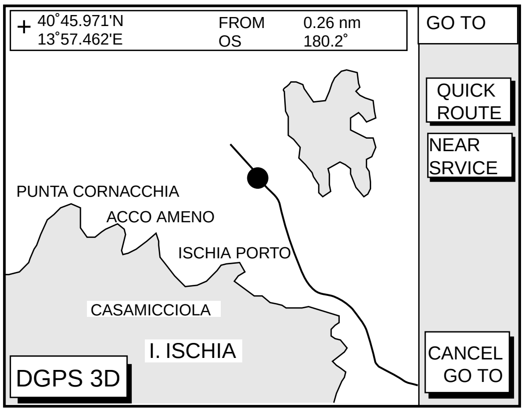

Figure 11-13 Plotter display

7. Press the soft key NEAR SRVICE. The SELECT PORT SERVICE window appears.

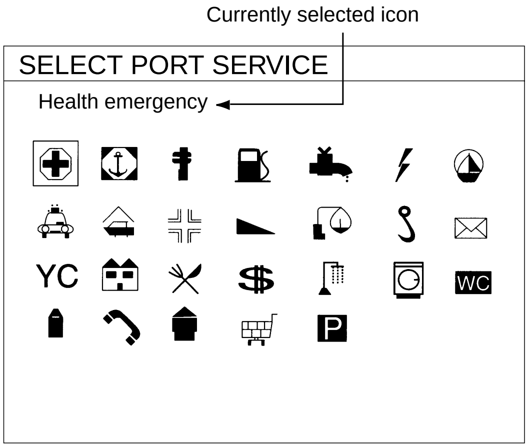

Figure 11-14 SELECT PORT SERVICE window

8. Use the cursor pad to select service mark desired. Currently selected icon is circumscribed. The name of currently selected icon appears at the top of the window. Refer to the user's manual of C-MAP NT for details about the icons.

9. Press the soft key ENTER or the [ENTER] key. Then, the display shows the locations of those services nearest you.

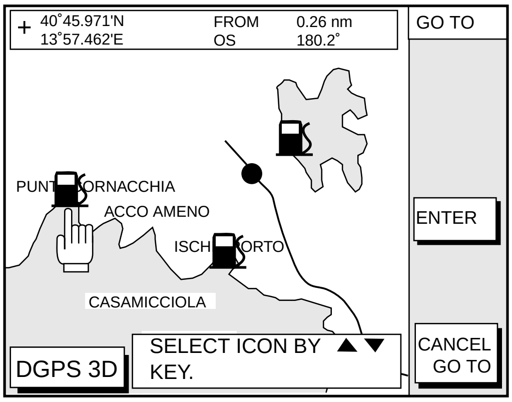

Figure 11-15 Sample filling station locations

10. Press ▲ or ▼ to place the "hand cursor" on the port service icon desired and press the soft key ENTER or the [ENTER] key.

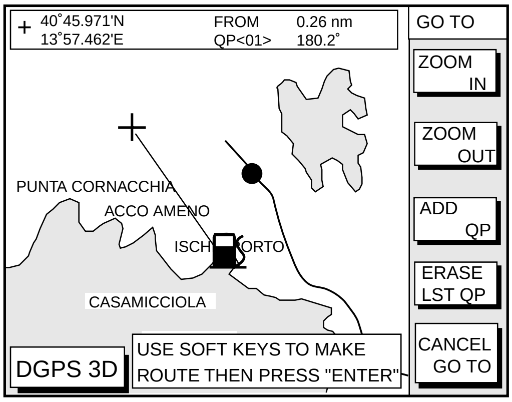

Figure 11-16 Make route window

11. Do one of the following:

Go directly to port service selected:
Press the [ENTER] key. The own ship and the port service is connected by a blue line. The range and bearing form own ship to the port service appears at the navigation data display.
You can go to the port service directly by steerings the ship to the hearing indicated.

Go to port service selected via waypoints, make a route as follows:
a) Move the cursor to the nearest waypoint of the port service.
b) Press the soft key ADD QP.
c) Repeat the above steps a) and b) to enter other waypoints.

d) Press the [ENTER] key to finish.
A line connects between own ship and the port service. And the range and bearing from own ship to first waypoint appears.

Note: Destination is automatically cancelled if there is no port for service selected.

11.5 Setting Chart Setup Options

CHART DETAILS menu

1. Press the [MENU] key followed by the soft keys CHART SETUP OPTIONS and CHART DETAILS.

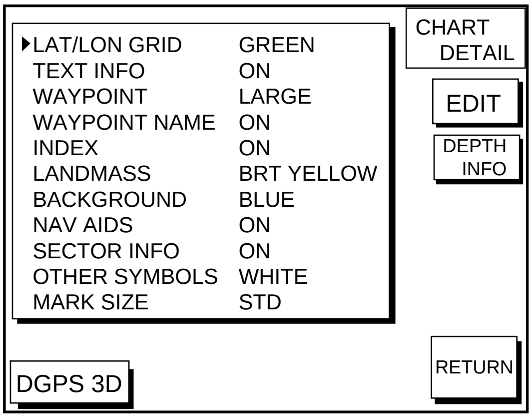

Figure 11-17 Chart details menu

2. Press ▲ or ▼ to select item and press the soft key EDIT.
3. Select option with cursor pad and press the soft key ENTER or the [ENTER] key.
4. Press the soft key RETURN to finish.

Items which are concerned with C-MAP NT-FP chart card are described here.

LANDMASS: Selects brightness and color of land. The default settings are bright (BRT) and yellow. When you select OFF, color of land is black.

BACKGROUND: When the C-MAP NT-FP chart card is used, this function is no inoperative.

NAV AIDS: Turns aids to navigation symbols (for example, buoys) on/off. The default setting is ON. When OFF is selected, symbols are displayed but information is not displayed (at the upper part of the screen).

SECTOR INFO: Turns lighthouse viewable angle indication on C-MAP NT-FP chart on/off. Viewing angle is shown as an arc extending from lighthouse position. This feature is available with selected charts. The default setting is ON. When you select OFF, the visual information is not displayed and the lighthouse is displayed as "!".

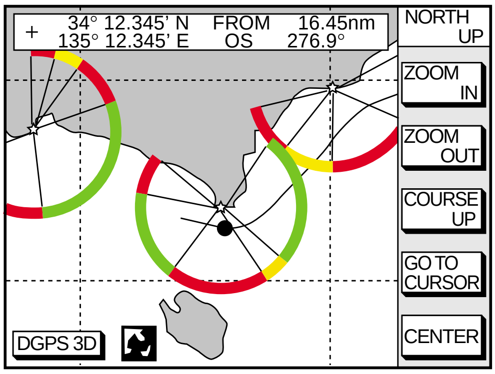

Figure 11-18 SECTOR INFO

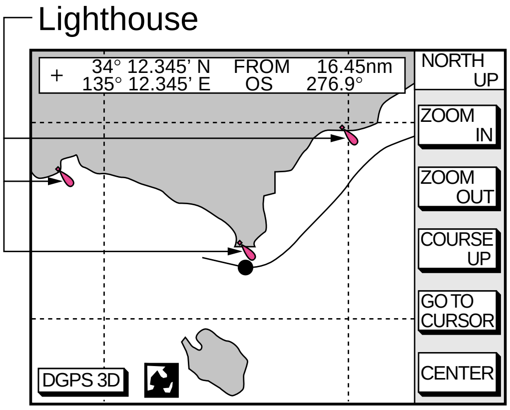

Figure 11-19 Lighthouse appearance when SECTOR INFO is off

OTHER SYMBOLS: Selects color of all other chart symbols. The default setting is white. When you select OFF, navaid icons are not displayed but alarm icons are displayed.

DEPTH INFO soft key: Turns the DEPTH INFO display on/off and sets it color in FURUNO chart, or selects the depth areas limit and spot sounding & bathymetric range in C-MAP NT-FP chart.

1. While displaying chart details menu, press the soft key DEPTH INFO to show the following display.

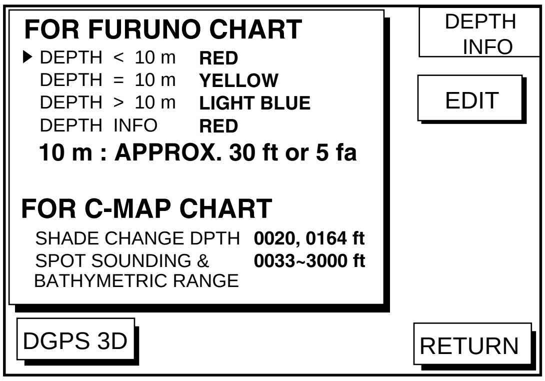

Figure 11-20 DEPTH INFO display

2. Press ▲ or ▼ to select item and press the soft key EDIT or enter the appropriate value by using numeric keys.
3. Select option with cursor pad and press the soft key ENTER or the [ENTER] key.
4. Press the soft key RETURN several times to finish.

SHADE CHANGE DPTH: Sets two values in the range of Depth Limit on the DEPTH INFO display when the C-MAP NT-FP chart is used. The Depth Areas are shown on the screen in three colors depending on depth.

0 to left value: Blue
left value to right value: Light-blue
greater than right value: Light-gray
(Maximum value: 12000 meter or 39369 ft)

In Figure 11-20, as the following,

0 - 20 ft: Blue
20 - 164 ft: Light-blue
greater than 164 ft: Light-gray

Note 1: Depth data depends on the registered value at "depth area". (See page 1.)

Note 2: It may be difficult to distinguish colors of track and mark/line in sea areas painted in light-blue or green.

SPOT SOUNDING & BATHYMETRIC RANGE: Sets the depth range to display the spot sounding on the C-MAP NT-FP chart. The depth range you set is displayed red.

11.6 Selecting Chart Scale/Range

Chart scale (range) may be selected with the soft key ZOOM IN or ZOOM OUT. ZOOM IN expands the chart; ZOOM OUT shrinks it. The range selected is momentarily displayed at the lower left-hand corner.

Note: When the display is expanded or shrunk beyond the range of the chart card in use the chart is not displayed, and an appropriate chart icon appears.

11.7 Displaying Program Number

1. Press the [MENU] key to open the main menu.
2. Press the soft key CONFIGURATION to show the configuration menu.
3. Press the soft key SYSTEM MENU to open the system menu.
4. Press the soft key SELF TEST to open the test menu.
5. Press the soft key MEMORY, I/O TEST to start the test. Test results and program numbers. are shown as below.

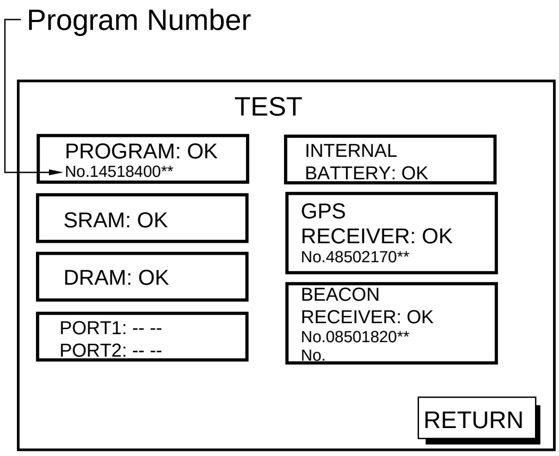

Figure 11-21 Memory, I/O test results

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12. MAINTENANCE & TROUBLESHOOTING

12.1 Maintenance

Regular maintenance is essential for good performance. A maintenance program should be established and should at least include the items listed in Table 12-1.

⚠ WARNING

Do not open the equipment.

Hazardous voltage which can cause electrical shock, burn or serious injury exists inside the equipment. Only qualified personnel should work inside the equipment.

Table 12-1 Recommended maintenance program

Item	Check point	Remedy
Antenna	Check for loosened and corroded bolts.	Tighten loosened bolts. Replace heavily corroded bolts.
Antenna cable	Check connection point for watertightness.	Replace damaged parts.
	Check connector for tightness and corrosion.	
	Check cables for damage.	
Display unit connectors	Check for tight connection.	Tighten loosened connectors.
Ground terminal	Check for tight connection and corrosion.	Clean or replace as necessary.
Display unit	Dust and foreign material on the display unit.	Dust may be removed with a soft cloth. if necessary anti-static cleaner may be used. Never use chemical solvents to clean the display; they can remove paint and markings.
LCD	Dust and foreign material on the screen.	Wipe the LCD carefully to prevent scratching, using tissue paper and an LCD cleaner. To remove dirt or salt deposits, use an LCD cleaner, wiping slowly with tissue paper so as to dissolve the dirt or salt. Change paper frequently so the salt or dirt will not scratch the LCD. Do not use solvents such as thinner, acetone or benzene for cleaning.

12.2 Replacement of Fuse, Battery

The fuse on the power cable protects the system from reverse polarity of the ship's mains and equipment fault. If the fuse blows, find the cause before replacing it. Use only a 3A fuse. Using the wrong fuse will damage the unit and void the warranty.

> ⚠ **CAUTION**
>
> **Use the correct fuse.**
>
> Use of a wrong fuse can cause fire or equipment damage.

A battery installed on a circuit board inside display unit preserves data when the power is turned off. The life of the battery is about three years. When the battery voltage is low the battery icon (🔋) appears on the display. When this happens, contact your dealer to request replacement of the battery.

	Type	Code Number
Lithium Battery	CR2450-F2 ST2	000-133-495

12.3 Simple Troubleshooting

Below are simple troubleshooting procedures which the user can follow to restore normal operation.

Table 12-2 Simple troubleshooting (plotter)

If...	Then...
you cannot turn on the power	check for blown fuse.
	check that the power connector is firmly tightened.
	check for corrosion on power cable connector.
	check for damaged power cable.
	check battery for proper voltage output (10.2 to 31.2 V).
power is on but nothing appears	press the [POWER/BRILL] key briefly and the cursor pad to adjust display brilliance and tone.
there is no response when a key is pressed	turn on the power again.
position is not fixed within 3 minutes.	check for loosened antenna connector.
	check for frequency deviation of GPS receiver on GPS monitor display.
	check GPS receiver status indicaion.
position is wrong	check that the correct geodetic chart system is selected on the GPS/DGPS/TD OPTIONS menu.
	enter GPS position offset on the GPS/DGPS/TD OPTIONS menu.
track is not plotted	plotting is stopped. ("H" appears on the plotter display.)
bearing is wrong	check that correct magnetic variation is entered on the DISPLAY OPTIONS menu.
Loran or Decca TDs do not appear	check that proper Loran or Decca chain codes are entered on the GPS/DGPS/TD OPTIONS menu.
Loran TDs are wrong	enter TD offset on the GPS/DGPS/TD OPTIONS menu.
ship's speed display is not zero after ship is stopped	try to decrease GPS speed smoothing setting on the GPS/DGPS/TD OPTIONS menu.

12.4 Error Messages

This equipment displays the following error messages on the alarm menu to alert you to possible trouble.

Table 12-4 Error messages

Error Message	Meaning, remedy
NO GPS FIX	No GPS signal. Check antenna cable.
NO DIFFERENTIAL GPS CORRECTION. (GP-1850D only)	No DGPS signal. Check antenna.
VOLTAGE OF INTERNAL BATTERY IS LOW.	Voltage of internal battery is low. Request replacement of battery.

12.5 Diagnostic Tests

Memory, I/O port test

This test conducts a general check of the display unit and the antenna unit. The unit displays the results for each device or component checked as OK or NG (No Good).

1. Press the [MENU] key to open the main menu.
2. Press the soft key CONFIGURATION to show the configuration menu.

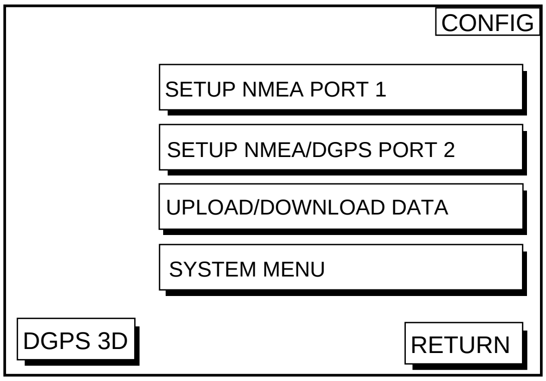


Figure 12-1 Configuration menu

3. Press the soft key SYSTEM MENU to open the system menu.

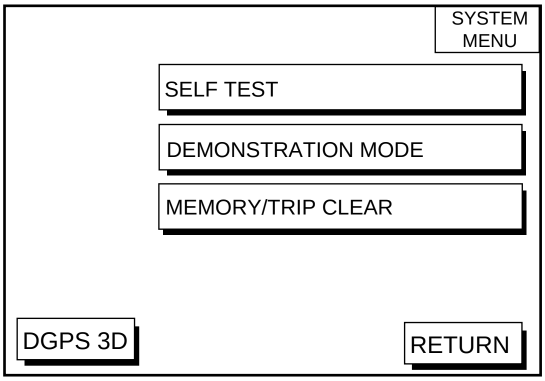


Figure 12-2 System menu

4. Press the soft key SELF TEST to open the test menu.

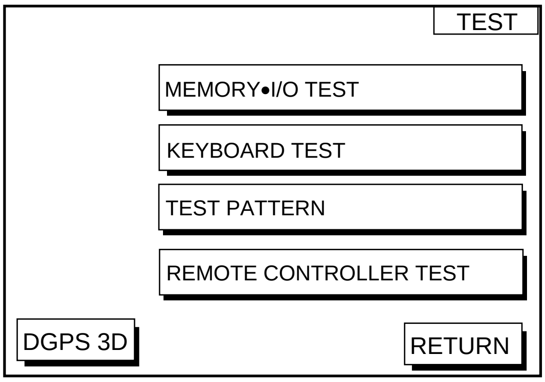
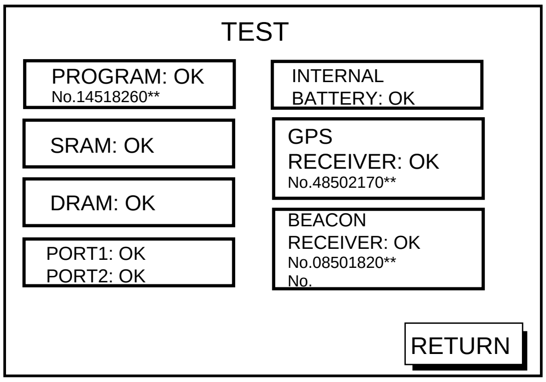


Figure 12-3 Test menu

5. Press the soft key MEMORY•I/O TEST to start the test. The test results appears as below.



: Special connections are required to check these ports. Otherwise, "--" appears.
**: Program Version No.

Figure 12-4 Memory, I/O test results

6. The test runs continuously. To return to the self test menu, press the soft key RETURN.

Note: BEACON RECEIVER results only appear on GP-1850D.

Keyboard test

This test checks all controls for proper operation.

1. Press the [MENU] followed by the soft keys CONFIGURATION, SYSTEM MENU and SELF TEST to display the self test menu.
2. Press the soft key KEYBOARD TEST to display the screen for testing the keyboard.

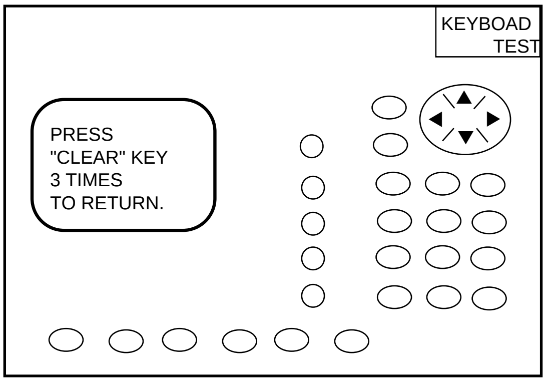


Figure 12-5 Keyboard test

3. Press any key. The pressed key's on-screen location turns black if the key is functioning properly.
4. To escape, press the [CLEAR] key three times.

Display test

1. Press the [MENU] key followed by the soft keys CONFIGURATION, SYSTEM MENU and SELF TEST to display the self test menu.
2. Press the soft key TEST PATTERN to open the test pattern display.
3. Press the [ENTER] key to change the test pattern.

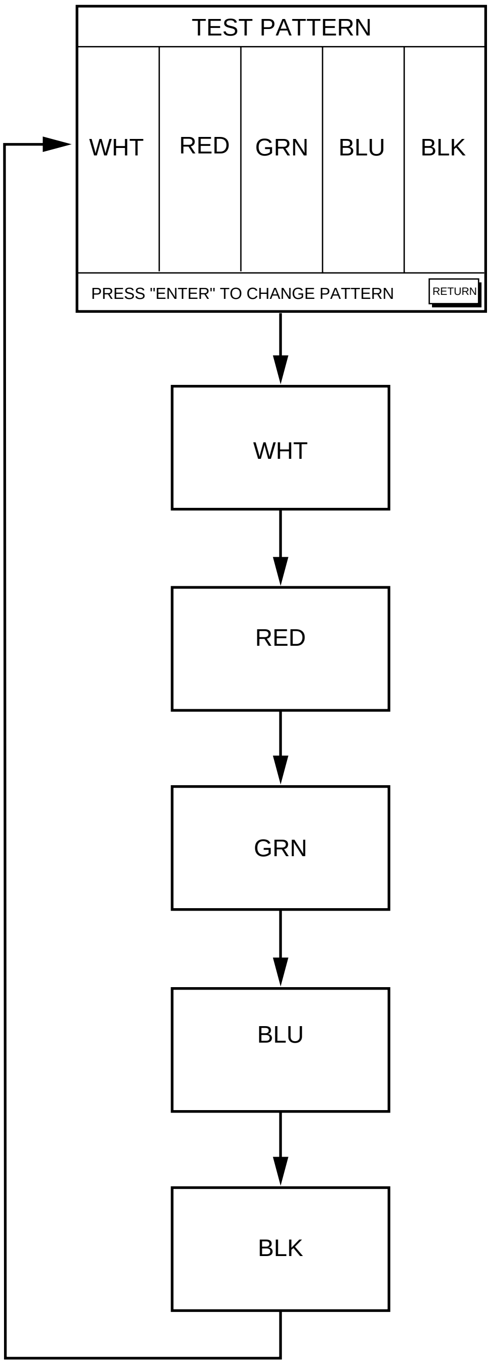


Figure 12-6 Display test pattern

Remote controller test

This test checks the controls of the remote controller for proper operation.

1. Press the [MENU] key followed by the soft keys CONFIGURATION, SYSTEM MENU and SELF TEST to display the self test menu.
2. Press the soft key REMOTE CONTROLLER TEST to display the screen for testing the remote controller.

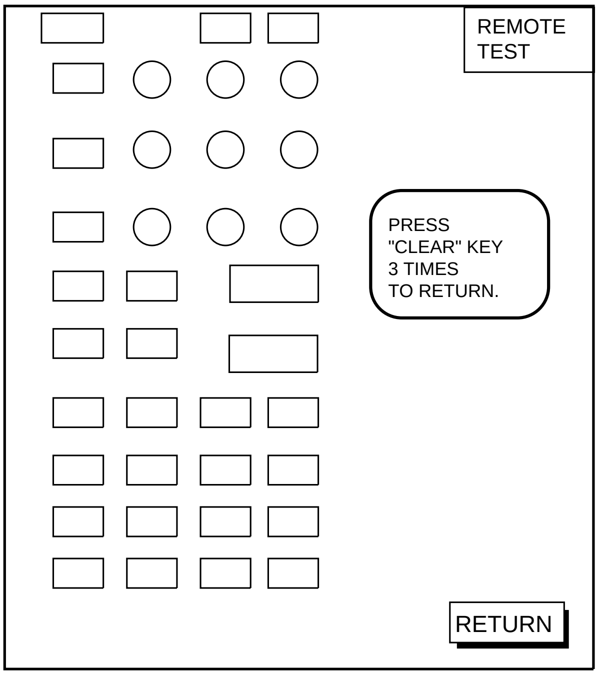


Figure 12-7 Remote controller test

3. Press the any key. The pressed key's on-screen location turns black if the key is functioning properly.
4. To escape, press the soft key RETURN on the display unit, or press the [CLEAR] key three times on the remote controller.

12.6 Clearing Memories

The memory, which stores marks, tracks and initial settings, can be cleared to start afresh. When this done all default settings are restored.

1. Press the [MENU] key followed by the soft keys CONFIGURATION and SYSTEM MENU.
2. Press the soft key MEMORY/TRIP CLEAR to open the clear memory menu.

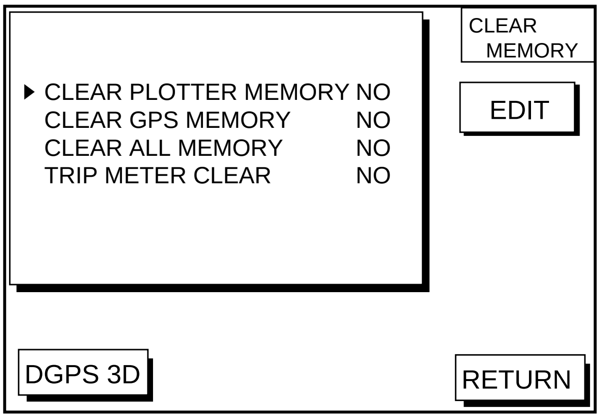


Figure 12-8 Clear memory menu

3. Press ▲ or ▼ to select memory/trip to clear.
4. Press the soft key EDIT.
5. Press ▲ to select YES.
6. Press the soft key ENTER or the [ENTER] key to clear memory selected.

Note: For PLOTTER MEMORY and CLEAR ALL MEMORY, all waypoints and routes are cleared and default settings are restored. If you require this data, save it to a PC.

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MENU TREE

MENU key

Default settings shown in bold italic.

- CHART SETUP OPTIONS
  - CHART OFFSET
  - TRACK CONTROL
    - DISPLAY TRACK (***ON***, OFF)
    - TRACK COLOR (***RED***, YELLOW, GREEN, LIGHT-BLUE, PURPLE, BLUE, WHITE)
    - PLOT (***TIME***, DISTANCE)
    - TIME INTERVAL (***00m10s***)
    - DIST INTERVAL (***00.10nm***)
    - TRACK MAMORY (***2000 POINTS***)
  - CHART DETAILS
    - LAT/LON GRID (***ON***, OFF; ***GREEN***)
    - TEXT INFO (***ON***, OFF)
    - WAYPOINT (***LARGE***, SMALL, OFF)
    - WAYPOINT NAME (***ON***, OFF)
    - INDEX (***ON***, OFF)
    - LANDMASS (***BRT***, DIM, OFF; ***YELLOW***)
    - BACKGROUND (BLACK, ***BLUE***)
    - NAV AIDS (***ON***, OFF)
    - SECTOR INFO (***ON***, OFF)
    - OTHER SYMBOLS (***ON***, OFF; ***WHITE***) (RED, YELLOW, GREEN, LIGHT BLUE, PURPLE, BLUE, WHITE)
    - MARK SIZE (***STD***, SMALL)
    - Soft key DEPTH INFO
      - **FURUNO chart**
        - DEPTH < 10m (***ON***, OFF***; RED***)
        - DEPTH = 10m (***ON***, OFF***; YELLOW***)
        - DEPTH > 10m (***ON***, OFF***; LIGHT BLUE***)
        - DEPTH INFO (***ON***, OFF***; RED***) (COLORS: RED, YELLOW, GREEN, LIGHT BLUE, PURPLE, BLUE, WHITE)
      - **C-MAP NT chart**
        - SHADE CHANGE DPTH
        - SPOT SOUNDING & BATHYMETRIC RANGE

Default settings shown in bold italic.

- DISPLAY OPTIONS
  - RNG & BRG MODE (GREAT CIRCLE, ***RHUMB LINE***)
  - RANGE/SPEED UNIT (***nm/kt***, km/km/h, sm/sm/h)
  - DEPTH UNIT (m, ***ft***, fa)
  - TEMP UNIT (°C, °***F***)
  - LAT/LON DISPLAY (DD°MM.MM', ***DD°MM.MMM'***, DD°MM.MMMM')
  - TIME DISPLAY (12HOUR, ***24HOUR***)
  - WAYPOINTS SW (AUTO1, ***AUTO2***, MANUAL)
  - COURSE VECTOR (VECTOR, ***LINE***, OFF)
  - BEARING (TRUE, ***MAGNETIC***)
  - MAG VARIATION (***AUTO***, MANUAL)
  - TD DISPLAY (***LORAN-C***, DECCA)
  - POSITION DISPLAY (***LAT/LON***, TD)
  - SET GO TO METHOD (***1POINT***, 35POINT, WPT/PORT SERVICE)
  - OPERATION MODE (***PLEASURE***, FISHING)
- GPS/DGPS/TD OPTIONS
  - GPS SETUP OPTIONS
    - LOCAL TIME OFFSET (***00:00***)
    - GEODETIC DATUMS (***WGS-84***)
    - POS SMOOTHING (***000 sec***)
    - SPD/CSE SMOOTHING (***005 sec***)
    - GPS SPEED AVE (***060 sec***)
    - LAT OFFSET (***0.000'N***)
    - LON OFFSET (***0.000'E***)
    - DISABLE SATELLITE
    - LATITUDE (***38.00.000'N***)
    - LONGITUDE (***123.00.000'W***)
    - ANT. HEIGHT (***005m***)
    - FIX MODE (2D, ***2D/3D***)
  - DGPS SETUP OPTIONS
    - DGPS MODE (***ON***, OFF)
    - BEACON FREQUENCY (***AUTO***, MANUAL)
    - BAUD RATE (***AUTO***, 50, 100, 200)
    - DGPS ALARM (***ON***, OFF)
  - TD SETUP
    - LORAN C (GRI, CORRECTION1, 2)
    - DECCA (DEC CHAIN, CORRECTION1, 2)

Loran C Default: 9940, 11-27 (US West Coast)
Decca Default: Chain: 01, R-G (South Baltic)

①

①

- CONFIGURATION
  - SETUP NMEA PORT 1
    - FORMAT (NMEA0183Ver.1.5, ***2.0***)
    - LAT/LON FORMAT (DD°MM.MM', ***DD°MM.MMM'***, DD°MM.MMMM)
  - SETUP NMEA/DGPS PORT 2
    - FORMAT (NMEA0183Ver.1.5, 2.0, RTCM104EX, ***RTCM104INTRN***, RTCM104OUT)
    - LAT/LON FORMAT (DD°MM.MM', ***DD°MM.MMM'***, DD°MM.MMMM)
  - SELECT SNTNC. soft key
    - (AAM, ***APB***, BOD, BWC/BWR, GGA, ***GLL***, RMA, ***RMB***, ***RMC***, ***VTG***, WPL, XTE, ***ZDA***)
  - UPLOAD/DOWNLOAD DATA
    - DOWNLOAD WAYPOINT/RTE TO PC
    - UPLOAD WAYPOINT/RTE FROM PC
    - SAVE DATA TO MEMORY CARD
    - LOAD DATA TO MEMORY CARD
  - SYSTEM MENU
    - SELF TEST (MEMORY, I/O; KEYBOARD; TEST PATTERN, REMOTE CONTROLLER TEST)
    - DEMONSTRATION MODE
    - MEMORY/TRIP CLEAR
      - CLEAR PLOTTER MEMORY (***NO***, YES)
      - CLEAR GPS MEMORY (***NO***, YES)
      - CLEAR ALL MEMORY (***NO***, YES)
      - TRIP METER RESET (***NO***, YES)

[WPT/RTE] key

- WAYPOINTS
  - LOCAL LIST
  - ALPHA/NUMERIC LIST
  - WAYPOINT BY CURSOR
  - WAYPOINT BY RANGE & BEARING
- ROUTES
- LOG
- CREATE VOYAGE BASED ROUTE

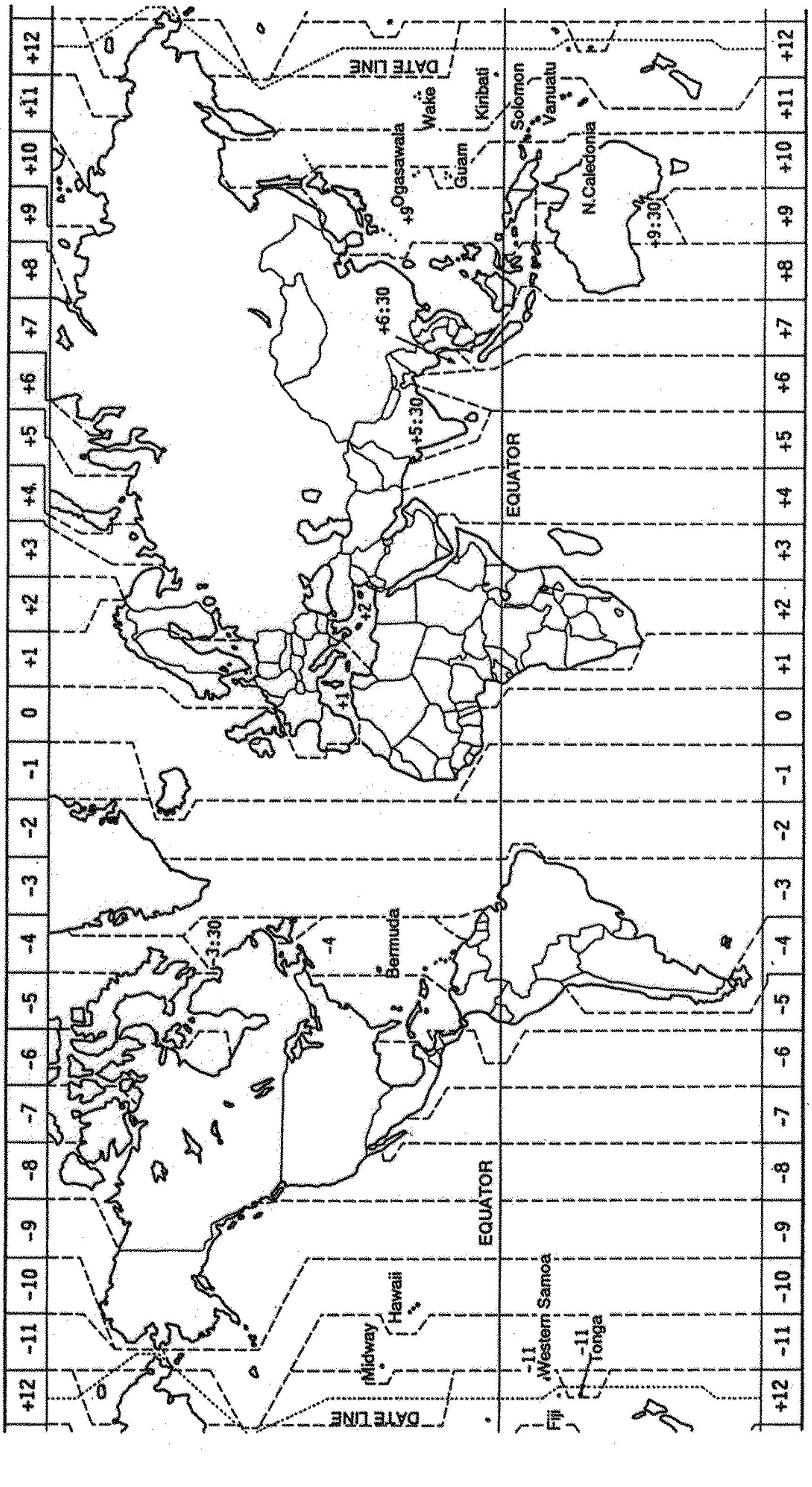
[ALARM] key

- AUDIO ALARM (***ON***, OFF)
- ARRIVAL ALARM (ON, ***OFF***)
- ANCHOR ALARM (ON, ***OFF***)
- PROXIMITY ALARM (ON, ***OFF***)
- XTE ALARM (ON, ***OFF***)
- SPEED ALARM (WITHIN, OVER/UNDER, ***OFF***)

Chain	GRI	S1	S2	S3	S4	S5
Central Pacific	4990	11	29	–	–	–
Canadian East Coast	5930	11	25	38	–	–
Commando Lion (Korea)	5970	11	31	42	–	–
Canadian West Coast	5990	11	27	41	–	–
South Saudi Arabia	7170	11	26	39	52	–
Labrador Sea	7930	11	26	–	–	–
Eastern Russia	7950	11	30	46	61	–
Gulf of Alaska	7960	11	26	44	–	–
Norwegian Sea	7970	11	26	46	60	–
Southeast USA	7980	11	23	43	59	–
Mediterranean Sea	7990	11	29	47	–	–
Western Russia	8000	10	25	50	65	–
North Central USA	8290	11	27	42	–	–
North Saudi Arabia	8990	11	25	40	56	69
Great Lakes	8970	11	28	44	59	–
South Central USA	9610	11	25	40	52	65
West Coast USA	9940	11	27	40	–	–
Northeast USA	9960	11	25	39	54	–
Northwest Pacific (old)	9970	11	30	55	81	–
Icelandic	9980	11	30	–	–	–
North Pacific	9990	11	29	43	–	–
Suez	4991	10	24			
England, France	8940	12	30			
Northwest Pacific	8930	11	30	50	70	
Newfoundland East Coast	7270	11	25			
Lessay	6731	10	39			
BØ	7001	11	27			
Sylt	7499	11	26			
Ejde	9007	10	23	38		
Saudia Arabia North	8830	11	25	39	56	
Saudia Arabia South	7030	11	25	37	55	

Decca Chains

Chain No.	Chain	Chain code	Location	Chain no.	Chain	Chain code	Location
01	South Baltic	0A	Europe	34	Kanto	8C	Japan
02	Vestlandet	0E	"	35	Shikoku	4C	"
03	Southwest British	1B	"	36	Hokuriku	2C	"
04	Northumbrian	2A	"	37	Kita Kyushu	7C	"
05	Holland	2E	"	38	Namaqualand	4A	Southern Africa
06	North British	3B	"	39	Cape	6A	"
07	Lofoten	3E	"	40	Eastern Province	8A	"
08		3F	"	41	South West Africa	9C	"
09	North Baltic	4B	"	42	Natal	10C	"
10	North West	4C	"	43	Dampier	8E	Australia
11	Trondelag	4E	"	44	Port Headland	4A	"
12	English	5B	"	45	Anticosti	9C	Northern America
13	North Bothnian	5F	"	46	East Newfoundland	2C	"
14	Southern Spanish	6A	"	47	Cabot Strait	6B	"
15	North Scottish	6C	"	48	Nova Scotia	7C	"
16	Gulf of Finland	6E	"				
17	Danish	7B	"				
18	Irish	7D	"				
19	Finnmark	7E	"				
20	French	8B	"				
21	South Bothnian	8C	"				
22	Hebridean	8E	"				
23	Frisian Islands	9B	"				
24	Helgeland	9E	"				
25	Skagerrak	10B	"				
26	North Persian Gulf	5C	Persian Gulf & India				
27	South Persian Gulf	1C	"				
28	Bombay	7B	"				
29	Calcutta	8B	"				
30	Bangladesh	6C	"				
31	Saliyah	2F	"				
32	Hokkaido	9C	Japan				
33	Tohoku	6C	"				


+12
+11
+10
+9
+8
+7
+6
+5
+4
+3
+2
+1
0
-1
-2
-3
-4
-5
-6
-7
-8
-9
-10
-11
-12
DATE LINE
Wake
Kiribati
Solomon
Vanuatu
Ogasawala
Guam
N.Caledonia
+9:30
+6:30
+5:30
EQUATOR
-3:30
Bermuda
Midway
Hawaii
Western Samoa
Tonga
Fiji

Geodetic Chart List

001: WGS84
002: WGS72
003: TOKYO : Mean Value (Japan, Korea & Okinawa)
004: NORTH AMERICAN 1927 : Mean Value (CONUS)
005: EUROPEAN 1950 : Mean Value
006: AUSTRALIAN GEODETIC 1984 : Australia & Tasmania
007: ADINDAN-MN : Mean Value (Ethiopia & Sudan)
008: ADINDAN-E : Ethiopia
009: ADINDAN-MA : Mali
010: ADINDAN-SE : Senegal
011 ADINDAN-SU : Sudan
012: AFG : Somalia
013: AIN EL ABD 1970 : Bahrain Is.
014: ANNA 1 ASTRO 1965 : Cocos Is.
015: ARC 1950-MN : Mean Value
016: ARC 1950-B : Botswana
017: ARC 1950-L : Lesotho
018: ARC 1950-M : Malawi
019: ARC 1950-S : Swaziland
020: ARC 1950-ZR : Zaire
021: ARC 1950-ZM : Zambia
022: ARC 1950-ZB : Zimbabwe
023: ARC 1960-MN : Mean Value (Kenya & Tanzania)
024: ARC 1960-K : Kenya
025: ARC 1960-T : Tanzania
026: ASCENSION IS. 1958 : Ascension Is.
027: ASTRO BEACON “E” : Iwo Jima Is.
028: ASTRO B4 SOR. ATOLL : Tern Is.
029: ASTRO POS 71/4 : St. Helena Is.
030: ASTRONOMIC STATION 1952 : Marcus Is.
031: AUSTRALIAN GEODETIC 1966 : Australia & Tasmania
032: BELLEVUE (IGN) : Efate & Erromango Islands
033: BERMUDA 1957 : Bermuda Islands
034: BOGOTA OBSERVATORY : Columbia
035: GAUPO INCHAUSPE : Argentina
036: CANTON IS. 1966 : Phoenix Islands
037: CAPE : South Africa
038: CAPE CANAVERAL : Mean Value (Florida & Bahama Islands)
039: CARTHAGE : Tunisia
040: CHATHAM 1971 : Chatham Is. (New Zealand)
041: CHUA ASTRO : Paraguay
042: CORREGO ALEGRE : Brazil
043: DJAKARTA (BATAVIA) : Sumatra Is. (Indonesia)
044: DOS 1968 : Gizo Is. (New Georgia Is.)
045: EASTER IS. 1967 : Easter Is.
046: EUROPEAN 1950-WE : Western Europe
047: EUROPEAN 1950-CY : Cyprus
048: EUROPEAN 1950-EG : Egypt
049: EUROPEAN 1950-ESC : England, Scotland, Channel & Shetland Islands
050: EUROPEAN 1950-EIS : England, Ireland, Scotland, & Shetland Islands
051: EUROPEAN 1950-GR : Greece
052 EUROPEAN 1950-IR : Iran
053: EUROPEAN 1950-SA : Italy, Sardinia
054: EUROPEAN 1950-SI : Italy, Sicily
055: EUROPEAN 1950-NF : Norway & Finland
056: EUROPEAN 1950-PS : Portugal & Spain
057: EUROPEAN 1979 : Mean Value
058: GANDAJIKA BASE : Republic of Maldives
059: GEODETIC DATUM 1949 : New Zealand
060: GUAM 1963 : Guam Is.
061: GUX 1 ASTRO : Guadalcanal Is.
062: HJORSEY 1955 : Iceland
063: HONG KONG 1363 : Hong Kong
064: INDIAN-TV : Thailand & Vietnam
065: INDIAN-BIN : Bangladesh, India & Nepal
066: IRELAND 1965 : Ireland
067: ISTS 073 ASTRO 1969 : Diego Garcia
068: JOHNSTON IS. 1961 : Johnston Is.
069: KANDAWALA : Sri Lanka
070: KERGUELEN IS. : Kerguelen Is.
071: KERTAU 1948 : West Malaysia & Singapore
072: LA REUNION : Mascarene Is.
073: L. C. 5 ASTRO : Cayman Brac Is.
074: LIBERIA 1964 : Liberia
075: LUZON : Philippines (excl. Mindanao Is.)
076: LUZON-M : Mindanao Is.
077: MAHE 1971 : Mahe Is.
078: MARCO ASTRO : Salvage Islands
079: MASSAWA : Eritrea (Ethiopia)
080: MERCHICH : Morocco
081: MIDWAY ASTRO 1961 : Midway Is.
082: MINNA : Nigeria
083: NAHRWAN-O : Masirah Is. (0man)
084: NAHRWAN-UAE : United Arab Emirates
085: NAHRWAN-SA : Saudi Arabia
086: NAMIBIA : Namibia
087: MAPARIMA, BWI : Trinidad & Tobago
088: NORTH AMERICAN 1927WU : Western United States
089: NORTH AMERICAN 1927EU : Eastern United States
090: NORTH AMERICAN 1927AK : Alaska
091: NORTH AMERICAN 1927BH : Bahamas (excl. San Salvador Is.)
092: NORTH AMERICAN 1927SS : Bahamas, San Salvador Is.
093: NORTH AMERICAN 1927CN : Canada (incl. Newfoundland Is.)
094: NORTH AMERICAN 1927AB : Alberta & British Columbia
095: NORTH AMERICAN 1927EC : East Canada
096: NORTH AMERICAN 1927MO : Manitoba & Ontario
097: NORTH AMERICAN 1927NE : Northwest Territories & Saskatchewan
098: NORTH AMERICAN 1927YK : Yukon
099: NORTH AMERICAN 1927CZ : Canal Zone
100: NORTH AMERICAN 1927CR : Caribbean
101: NORTH AMERICAN 1927CA : Central America
102: NORTH AMERICAN 1927CU : Cuba
103: NORTH AMERICAN 1927GR : Greenland
104: NORTH AMERICAN 1927MX : Mexico
105: NORTH AMERICAN 1983AK : Alaska
106: NORTH AMERICAN 1983CN : Canada
107: NORTH AMERICAN 1983CS : CONUS
108: NORTH AMERICAN 1983MX : Mexico, Central America
109: OBSERVATORIO 1966 : Corvo & Flores Islands (Azores)
110: OLD EGYPTIAN 1930 : Egypt
111: OLD HAWAIIAN-MN : Mean Value
112: OLD HAWAIIAN-HW : Hawaii
113: OLD HAWAIIAN-KA : Kauai
114: OLD HAWAIIAN-MA : Maui
115: OLD HAWAIIAN-OA : Oahu
116: OMAN : Oman
117: ORDNANCE SURVEY OF GREAT BRITAIN 1936-MN: Mean Value
118: ORDNANCE SURVEY OF GREAT BRITAIN 1936-E: England
119: ORDNANCE SURVEY OF GREAT BRITAIN 1936-IM: England, Isle of Man & Wales
120: ORDNANCE SURVEY OF GREAT BRITAIN 1936-SSI: Scotland, & Shetland Islands
121: ORDNANCE SURVEY OF GREAT BRITAIN 1936-WL: Wales
122: PICO DE LAS NIVIES : Canary Islands
123: PITCAIRN ASTRO 1967 : Pitcairn Is.
124: PROVISIONS SOUTH CHILEAN 1963: South Chile (near 53˚ S)
125: PROVISIONAL SOUTH AMERICAN 1956MN: Mean Value
126: PROVISIONAL SOUTH AMERICAN 1956BO: Bolivia
127: PROVISIONAL SOUTH AMERICAN 1956NC: Chile-Northern Chile (near 19˚S)
128: PROVISIONAL SOUTH AMERICAN 1956SC: Chile-Southern Chile (near 43˚S)
129: PROVISIONAL SOUTH AMERICAN 1956CO: Columbia
130: PROVISIONAL SOUTH AMERICAN 1956EC: Ecuador
131: PROVISIONAL SOUTH AMERICAN 1956GY: Guyana
132: PROVISIONAL SOUTH AMERICAN 1956PR: Peru
133: PROVISIONAL SOUTH AMERICAN 1956VN: Venezuela
134: PUERTO RICO : Puerto Rico & Virgin Islands
135: QATAR NATIONAL : Qatar
136: QORNOQ : South Greenland
137: ROME 1940 : Sardinia Islands
138: SANTA BRAZ : Sao Maguel, Santa Maria Islands (Azores)
139: SANTO (DOS) : Espirito Santo Is.
140: SAPPER HILL 1943 : East Falkland Is.
141: SOUTH AMERICAN 1969MN : Mean Value
142: SOUTH AMERICAN 1969AG : Argentina
143: SOUTH AMERICAN 1969BO : Bolivia
144: SOUTH AMERICAN 1969BR : Brazil
145: SOUTH AMERICAN 1969CH : Chile
146: SOUTH AMERICAN 1969CO : Columbia
147: SOUTH AMERICAN 1969EC : Ecuador
148: SOUTH AMERICAN 1969GY : Guyana
149: SOUTH AMERICAN 1969PA : Paraguay
150: SOUTH AMERICAN 1969PR : Peru
151: SOUTH AMERICAN 1969TT : Trinidad & Tobago
152: SOUTH AMERICAN 1969VZ : Venezuela
153: SOUTH ASIA : Singapore
154: SOUTHEAST BASE : Porto Santo & Madeira Islands
155: SOUTHWEST BASE : Faial, Graciosa, Pico, Sao Jorge, & Terceira Is.
156: TIMBALAI 1948 : Brunei & East Malaysia (Sarawak & Sadah)
157: TOKYO JP : Japan
158: TOKYO KP : Korea
159: TOKYO OK : Okinawa
160: TRISTAN ASTRO 1968 : Tristan da Cunha
161: VITI LEVU 1916 : Viti Levu Is. (Fiji Islands)
162: WAKE-ENIWETOK 1960 : Marshall Islands
163: ZANDERIJ : Surinam
164: BUKIT RIMPAH : Bangka & Belitung Islands (Indonesia)
165: CAMP AREA ASTRO : Camp Mcmurdo Area, Antarctica
166: G. SEGARA : Kalimantan Is. (Indonesia)
167: HERAT NORTH : Afghanistan
168: HU-TZU-SHAN : Taiwan
169: TANANARIVE OBSERVATORY 1925: Madagascar
170: YACARE : Uruguay
171: RT-90 : Sweden
172: Pulkovo 1942 : Russia
173: Finish KKJ : Finland

SPECIFICATIONS OF
COLOR GPS/ PLOTTER: GP-1850
COLOR DGPS/ PLOTTER: GP-1850D

1. GENERAL

(1)	Display	6.5 inch high resolution color LCD
(2)	Projection	Mercator
(3)	Usable Area	85° latitude or below
(4)	Display Mode	Plotter, Video pilot, Highway display, Waypoint display
(5)	Alarms	Arrival and Anchor watch, Cross track error and proximity alarms, Ship's speed in and out alarms

2. GPS RECEIVER

(1)	Receiving Channels	12 channels parallel, 12 satellite tracking
(2)	Rx Frequency	1575.42 MHz
(3)	Rx Code	C/A code
(4)	Position Fixing System	All in view, 8-state Kalman filter
(5)	Position Accuracy	Approx. 10 m, 95% of the time, horizontal dilution of position (HDOP)≤1 Note: All GPS receiver are subject to degradation of position and velocity accuracy under the U.S. Department of Defense. Position may be degraded. DGPS: approx. less than 5 m, 95% of the time
(6)	Tracking Velocity	900 kts
(7)	Position-fixing Time	Warm start: 12 seconds, Cold start: 90 seconds
(8)	Position Update Interval	1 second
(9)	DGPS Data Receiving	RTCM SC-104 Ver 2.1 formatted (External DGPS data required for GP-1850)

3. DISPLAY SECTION

(1)	Effective area	133.4×97.3 mm
(2)	Display pixels	234×320 dots
(3)	Position Indication	Latitude/longitude or Loran C LOP or DECCA LOP

4. PLOTTER

(1)	Effective Projection Area	0.125 nm to 2,048 nm (at equatorial area)
(2)	Track Display	Plot interval: by time (0 to 99 min. 59 sec.) or by distance (0 to 99.99 nm)
(3)	Colors	Red, yellow, green , purple, light-blue, blue, white

(4)	Memory Capacity	Track/Mark: 5000 points, Waypoint: 800 points
(5)	Storage Capacity	Simple route: 200 routes with 35 waypoints each
(6)	MOB	1 point
(7)	Quick routes	1 course with 35 waypoints max.
(8)	Electronic Chart	FURUNO chart card or NAVIONICS chart card available C-MAP chart card also available for C-MAP NT Model

5. DATA INPUT / OUTPUT

(1)	Input data	IEC61162-1 and NMEA0183 Ver1.5 adopted $**TLL, $**DPT, $**DBT, $**MTW, $GPWPL
(2)	Output data	IEC61162-1 or NMEA0183 Ver1.5 selected $GPAAM, $GPAPB, $GPBOD, $GPBWR/GPBWC, $GPGLL, $GPGGA, $GPRMA, $GPRMB, $GPRMC, $GPVTG, $GPWPL, $GPXTE, $GPZDA

6. POWER SOURCE

(1)	For DC Source	
	GP-1850:	12-24 VDC: 1.2-0.6 A max.
	GP-1850D:	12-24 VDC: 1.3-0.7 A max.
(2)	For AC Source	100/110/115/200/220/230 VAC, 1 phase, 50/60 Hz (optional rectifier required)

7. ENVIRONMENTAL CONDITIONS

(1)	Useable Temperature	Antenna unit: -25ºC to + 70ºC Display unit: -15ºC to +55ºC
(2)	Relative Humidity	90% (40ºC)
(3)	Waterproofing	Antenna unit: IEC60529 IPX6 Display unit: IEC60529 IPX5

8. COATING COLOR

(1)	Display Unit	Cover: Munsell 2.5GY5/1.5 Panel: N3.0
(2)	Antenna Unit	N9.5

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FURUNO

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Declaration of Conformity

CE 0560

We FURUNO ELECTRIC CO., LTD.

(Manufacturer)

9-52 Ashihara-Cho, Nishinomiya City, 662-8580, Hyogo, Japan

(Address)

declare under our sole responsibility that the product

Color GPS plotter model GP-1850
Color DGPS plotter model GP-1850D
Color GPS plotter/sounder model GP-1850F
Color DGPS plotter/sounder model GP-1850DF
(Serial No. 3420-0001 for GP-1850DF)

(Model name, serial number)

is in conformity with the essential requirements as described in the Directive 1999/5/EC of the European Parliament and of the Council of 9 March 1999 on radio equipment and telecommunications terminal equipment (R&TTE Directive) and satisfies all the technical regulations applicable to the product within this Directive

EN 60945: 1997-01 (IEC 60945 Third edition: 1996-11)

(title and/or number and date of issue of the standard(s) or other normative document(s))

For assessment, see

- Statement of Opinion N° 01214012/AA/00 of 15 January 2001 issued by KTL Certification, The Netherlands
- Test report FLI 12-99-002 of 26 January 1999 prepared by Furuno Labotech International Co., Ltd.

On behalf of Furuno Electric Co., Ltd.

Hiroaki Komatsu
Manager,
International Rules and Regulations

(name and signature or equivalent marking of authorized person)

Nishinomiya City, Japan
January 23, 2001

(Place and date of issue)